NOTICE

All drawings located at the end of the document.

COLORADO DEPARTMENT OF PUBLIC HEALTH AND ENVIRONMENT
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ROCKY FLATS ENVIRONMENTAL
TECHNOLOGY SITE

U.S. DEPARTMENT OF ENERGY ROCKY FLATS ENVIRONMENTAL TECHNOLOGY SITE

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SEPTEMBER 23, 1994

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LETTER REPORT
COLORADO DEPARTMENT OF PUBLIC HEALTH AND ENVIRONMENT
CONSERVATIVE SCREEN
TO DEFINE AREAS OF CONCERN AT
OPERABLE UNIT 3

ROCKY FLATS ENVIRONMENTAL TECHNOLOGY SITE

U.S. DEPARTMENT OF ENERGY ROCKY FLATS ENVIRONMENTAL TECHNOLOGY SITE GOLDEN, COLORADO

ENVIRONMENTAL RESTORATION PROGRAM

SEPTEMBER 23, 1994

EG&G ROCKY FLATS ENVIRONMENTAL TECHNOLOGY SITE
CDPHE Conservative Screen
Operable Unit 3

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LIST OF ACRONYMS AND ABBREVIATIONS

The following is a list of acronyms used throughout this CDPHE Conservative Screen Report:

BGCR Background Geochemical Characterization Report

CDPHE Colorado Department of Public Health and Environment

COC Chemicals of Concern
DOE U.S. Department of Energy

EPA U.S. Environmental Protection Agency

HHRA Human Health Risk Assessment

IHSS Individual Hazardous Substances Site

OU 3 Operable Unit 3

PCOC potential chemical of concern

PRG Programmatic Preliminary Remediation Goal

RBC risk-based concentration

RCRA Resource Conservation and Recovery Act
RFEDS Rocky Flats Environmental Database System
RFETS Rocky Flats Environmental Technology Site

RFI RCRA Facility Investigation

RI Remedial Investigation (CERCLA)

TM technical memorandum
UCL upper confidence limit
VOC volatile organic compound

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EXECUTIVE SUMMARY

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EXECUTIVE SUMMARY

This executive summary provides results of the Colorado Department of Public Health and Environment (CDPHE) Conservative Screen for Operable Unit No. 3 (OU 3), located adjacent to the Rocky Flats Environmental Technology Site (RFETS). The CDPHE Conservative Screen was developed as part of the Data Aggregation process used in Human Health Risk Assessments (HHRA) for RFETS by CDPHE, the U.S. Environmental Protection Agency (EPA), and the U.S. Department of Energy (DOE) (CDPHE/EPA/DOE, 1994). The conservative screening process is used in conjunction with the chemicals of concern (COC) selection process to identify OUspecific COCs and the areas within the OUs that may be impacted by those chemicals.

The CDPHE Conservative Screen includes the following six steps:

STEP 1: Define potential chemicals of concern (PCOCs)

STEP 2: Identify "Source Areas"

STEP 3: Calculate a risk-based concentration (RBC) for each PCOC

STEP 4: Calculate a RBC Ratio Sum for each Source Area

 STEP 5: Apply CDPHE Conservative Screen decision criteria to each Source Area

STEP 6: Define "Area(s) of Concern"

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In Step 1 of the CDPHE Conservative Screen, OU 3 data were compared to background and benchmark data to identify PCOCs for each medium in each Individual Hazardous Substance Site (IHSS) of OU 3. The following PCOCs were identified:

- IHSS 199 (Contamination of Soil): ²⁴¹Am and ^{239/240}Pu for surface soil
- IHSS 200 (Great Western Reservoir): ^{239/240}Pu for surface sediments, strontium for groundwater, and ^{239/240}Pu and copper for subsurface sediments
- IHSS 201 (Standley Lake): None
- IHSS 202 (Mower Reservoir): None

The purpose of Step 2 of the CDPHE Conservative Screen is to identify "Source Areas" within OU 3. Source Areas are defined as all sample locations where concentrations (nonradionuclides) or activities (radionuclides) of inorganic PCOCs are greater than upper-bound background values (i.e., background mean plus two standard deviations), and all sample locations where concentrations of organic PCOCs are greater than reported detection limits (CDPHE/EPA/DOE, 1994). Sixty-six soil sample locations were identified as Source Areas by Step 2. Background data were not available to perform this step for PCOCs in IHSS 200, so the entire reservoir was considered as a Source Area for subsequent steps of the CDPHE Conservative Screen.

In **Step 3** of the CDPHE Conservative Screen, RBCs were calculated for each PCOC. The RBCs presented in the <u>Final Rocky Flats Programmatic Risk-Based Preliminary Remediation Goals</u> (DOE, 1994c) were used for Step 3 for OU 3. The RBCs are based on a residential exposure scenario for soil, sediments, and groundwater.

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In Step 4 of the CDPHE Conservative Screen, maximum detected concentrations or activities of the PCOCs in each medium were compared to the RBCs. The following RBC Ratio Sum was calculated for each Source Area:

RBC Ratio
$$\sum_{j=1}^{m} \sum_{i=1}^{n} (maximum concentration or activity_{ij} | RBC_{ij}))$$

where

RBC = risk-based concentration

i = medium

i = PCOC

maximum concentration or activity = maximum concentration or activity in the Source Area

Three of the surface-soil Source Areas identified in Step 2 have RBC Ratio Sums greater than 1. The RBC Ratio Sum for Great Western Reservoir (sediments and groundwater) is also greater than 1. All other Source Areas for OU 3 had RBC Ratio Sums less than 1 (i.e., 63 surface-soil locations).

In Step 5 of the CDPHE Conservative Screen, the following decision criteria were used to determine further action for Source Areas:

- If the RBC Ratio Sum for a Source Area is greater than or equal to 100, DOE may conduct a Voluntary Corrective Action for that portion of the OU.
- If the RBC Ratio Sum for a Source Area is between 1 and 100, DOE must conduct an HHRA for that Source Area, in accordance with <u>Risk Assessment</u> <u>Guidance for Superfund (EPA, 1989a)</u>.
- If the RBC Ratio Sum for a Source Area is less than or equal to 1, no further action is required pending an evaluation of dermal exposure.

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All RBC Ratio Sums for surface-soil Source Areas in OU 3 are either less than 1 or in the 1 to 100 range. The three surface-soil Source Areas with RBC Ratio Sums between 1 and 100 require further evaluation in a HHRA. The surface-soil Source Areas with RBC Ratio Sums less than 1 require no further action. For those surface-soil Source Areas with RBC Ratio Sums less than 1, a screening for dermal exposure (i.e., comparison of maximum activities to Dermal RBCs [RBC based on exposure via dermal absorption]) indicated dermal contact with soil is not a significant exposure pathway for OU 3.

The RBC Ratio Sum for Great Western Reservoir is greater than 1; therefore, this Source Area requires further evaluation in a HHRA. IHSSs 201 and 202 require no further action; RBC Ratio Sums were not calculated for these reservoirs because no PCOCs were identified for Standley Lake or Mower Reservoir.

"Areas of Concern" for OU 3 were identified in Step 6 of the CDPHE Conservative Screen. Areas of Concern are defined as one or several Source Areas grouped spatially in close proximity (CDPHE/EPA/DOE, 1994). In the HHRA for OU 3, the three surface-soil Source Areas with RBC Ratio Sums greater than 1 will be considered as separate Areas of Concern because each of the Source Areas represents an area large enough to be considered a single residential exposure area (i.e., approximately 10 acres), and the Source Areas are separated by areas that have RBC Ratio Sums less than 1. The Great Western Reservoir (IHSS 200) Source Area is also considered an Area of Concern for the HHRA.

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Section 1.0 INTRODUCTION

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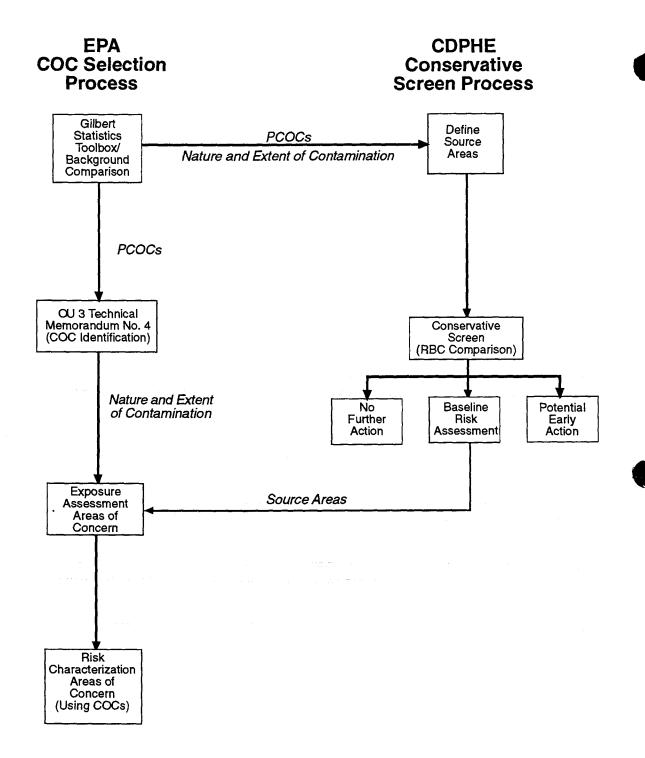
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1.0 INTRODUCTION

The purpose of this report is to document the results of the Colorado Department of Public Health and Environment (CDPHE) Conservative Screen for Operable Unit No. 3 (OU 3), located adjacent to the Rocky Flats Environmental Technology Site (RFETS). The CDPHE Conservative Screen was used to identify "Source Areas" and "Areas of Concern" (i.e., one or several Source Areas grouped in close proximity) that will be addressed in the Human Health Risk Assessment (HHRA) portion of the Resource Conservation and Recovery Act (RCRA) Facility Investigation/Remedial Investigation (RFI/RI) report for OU 3. OU 3 consists of the following Individual Hazardous Substances Sites (IHSSs):

- IHSS 199: Contamination of Soils
- IHSS 200: Great Western Reservoir
- IHSS 201: Standley Lake
- IHSS 202: Mower Reservoir.

The CDPHE Conservative Screen was developed as part of the Data Aggregation process used in HHRAs for RFETS by CDPHE, the U.S. Environmental Protection Agency (EPA), and the U.S. Department of Energy (DOE). The CDPHE Conservative Screen is used in conjunction with the chemicals of concern (COC) selection process (this process is discussed in Technical Memorandum No. 4, Human Health Risk Assessment, Chemicals of Concern Identification, Operable Unit 3, Rocky Flats Plant; DOE, 1994b), specified by EPA, to identify OU-specific COCs and the areas within the OUs that may be impacted by those chemicals (Figure 1-1). Results of the CDPHE Conservative Screen are used, in effect, to redefine the OU boundaries in terms of the area within the OU that exhibits chemical levels that exceed risk-based concentrations. Guidance for the Data Aggregation process was provided in a memorandum from DOE (DOE, 1994a) and at a presentation by CDPHE, EPA, and DOE on June 3, 1994 (CDPHE/EPA/DOE, 1994). (See Appendix A for copies of the memorandum and presentation materials.)



CDPHE = Colorado Department of Public Health and Environment

COC = Chemicals of Concern

EPA = U.S. Environmental Protection Agency

PCOC = Potential Chemical of Concern

Source: CDPHE/EPA/DOE, 1994

Figure 1-1
COC/AREA OF CONCERN
IDENTIFICATION PROCESSES

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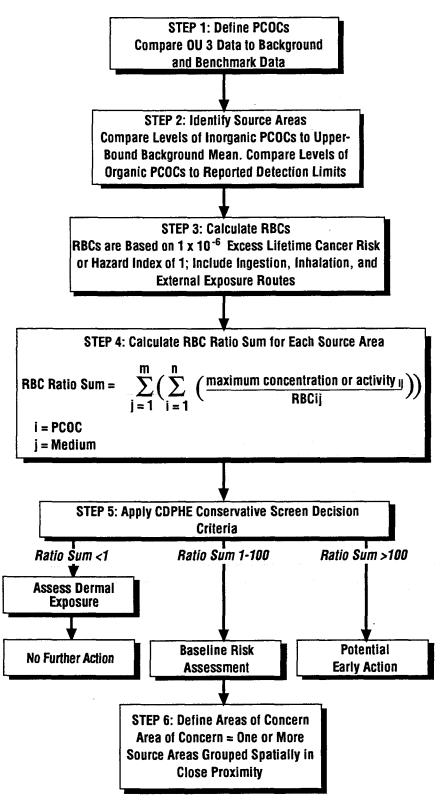
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The CDPHE Conservative Screen Process (Figure 1-2) (CDPHE/EPA/DOE, 1994) includes the following steps:

- Step 1 Define Potential Chemicals of Concern (PCOCs) OU 3 data are compared to available background data, using statistical comparison tests, to identify PCOCs for each environmental medium. In addition, for OU 3, mean and maximum values for site data are compared to literature benchmark data and analyzed using various semi-quantitative methods. Environmental media for OU 3 include surface soil, sediment, surface water, and groundwater.
- Step 2-Identify Source Areas An Inorganic Source Area includes all sample locations in OU 3 where concentrations (nonradionuclides) or activities (radionuclides) of inorganic PCOCs are greater than upper-bound background values (i.e., background mean plus two standard deviations). An Organic Source Area includes all sample locations in OU 3 where concentrations of organic PCOCs are greater than reported detection limits.
- Step 4 Calculate RBC Ratio Sum for each Source Area Calculation of a RBC Ratio Sum involves three intermediate steps: (1) calculate ratio of maximum detected concentration or activity to RBC for each PCOC; (2) sum PCOC ratios for each medium; and (3) sum media ratios for each Source Area. RBC Ratio Sums are calculated for each Source Area to identify areas within OU 3 that may require further evaluation or action, based on RBC reference levels.

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CDPHE = Colorado Department of Public Health and Environment

PCOC = Potential Chemical of Concern

RBC = Risk-Based Concentration

Figure 1-2
CDPHE CONSERVATIVE SCREEN PROCES
CDPHE LETTER REPORT

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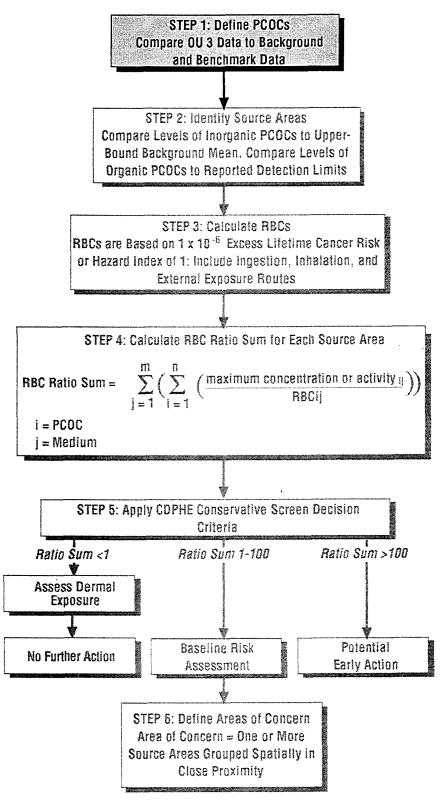
- Step 5-Apply CDPHE Conservative Screen Decision Criteria Identify the Source Areas that require no further action pending assessment of dermal exposure (i.e., Source Areas with Ratio Sums less than 1) and those that require further action. Source Areas with Ratio Sums between 1 and 100 require a baseline risk assessment; DOE may pursue voluntary corrective action for Source Areas with Ratio Sums greater than 100.
- Step 6 Define Area(s) of Concern An Area of Concern is an area within OU 3
 that requires further evaluation, based on RBC reference levels. An Area of
 Concern consists of one or several Source Areas grouped spatially in close
 proximity.

The methodologies and results for each of these steps, as applied to each IHSS in OU 3, are described in the following sections of this report.

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Section 2.0 STEP 1: POTENTIAL CHEMICAL OF CONCERN IDENTIFICATION

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CDPHE = Colorado Department of Public Health and Environment

PCOC = Potential Chemical of Concern

RBC = Risk-Based Concentration

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2.0 STEP 1: POTENTIAL CHEMICAL OF CONCERN IDENTIFICATION

The purpose of Step 1 is to identify PCOCs for OU 3. PCOCs are defined as inorganic analytes with concentrations or activities detected in OU 3 that are significantly elevated over background levels, and organic analytes detected in OU 3 at concentrations greater than the detection limits reported in the Rocky Flats Environmental Database System (RFEDS) data. The data selection procedures used to identify PCOCs are discussed in Subsection 2.1.

Step 1 of the CDPHE Conservative Screen corresponds to the "Statistical Comparison to Background" step of the EPA COC selection process for the HHRA. A brief description of this step is provided in Subsection 2.2 for each IHSS of OU 3. Results of the PCOC identification are then presented in Subsection 2.3. A detailed discussion of the methodologies, including the selection of data used in the CDPHE Conservative Screen, statistical methods, and interpretation of results, is available in Technical Memorandum No. 4, Human Health Risk Assessment, Chemicals of Concern Identification, Operable Unit 3, Rocky Flats Plant (TM 4) (DOE, 1994b).

2.1 DATA SETS EVALUATED IN THE CDPHE CONSERVATIVE SCREEN

Data collected during the OU 3 RFI/RI field investigation program were prepared for quantitative data analysis tasks, including the CDPHE Conservative Screen, following standard data-treatment protocols. A detailed description of the preparation process is included in Section 2.0 and Appendix A of TM 4. In addition, surface soil data from the Jefferson County Remedy Acres (DOE, 1991a) and sediment data from the 1983/84 Sediment Investigations in Great Western Reservoir (IHSS 200) and Standley Lake (IHSS 201) (DOE, 1991b) were used in the CDPHE Conservative Screen.

The OU 3 sample data sets are summarized in Table 2-1 by IHSS and medium, and the data sets used in the CDPHE Conservative Screen are identified. PCOCs will be identified for each IHSS and medium indicated in Table 2-1 and will be analyzed separately using the CDPHE Conservative Screen process.

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TABLE 2-1 OU 3 DATA SETS ROCKY FLATS ENVIRONMENTAL TECHNOLOGY SITE

			Used in CDPHE
IHSS		Description	Screen?
199	Surface Soil	61 RFI/RI plots, average of CDPHE (0 - 0.25") and RFP (0 - 2") sample collection methods; 47 Jefferson County Remedy Acres locations	YES
	Subsurface Soil	11 trenches were sampled at 10 depth intervals down to 96 cm	NO
200	Surface Water	13 sample locations in reservoir and streams/ditches	YES
	Surface Sediment	41 RFI/RI sample locations in reservoir and streams/ditches sampled from 0 to 6"; 51 1983/84 sample locations	YES
	Subsurface Sediments	8 sample locations in reservoir sampled at 1" and 2" depth intervals down to approximately 36"	YES
	Ground Water	1 sample location	YES
201	Surface Water	12 sample locations in reservoir and streams/ditches	YES
	Surface Sediment	48 sample locations in reservoir and streams/ditches sampled from 0 to 6"; 63 1983/84 sample locations	YES
	Subsurface Sediments	8 sample locations in reservoir sampled at 1" and 2" depth intervals down to approximately 36"	NO*
	Ground Water	1 sample location	YES
202	Surface Water	8 sample locations in reservoir and streams/ditches	YES
	Surface Sediment	14 sample locations in reservoir and streams/ditches sampled from 0 to 6"	YES
	Subsurface Sediments	4 sample locations in reservoir sampled at 1" and 2" depth intervals down to approximately 36"	NO*

Note: * = Incomplete exposure pathway

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The following media were evaluated in the CDPHE Conservative Screen for OU 3 (Table 2-1):

- Surface soil
- Surface sediments (0 to 6 inches) in reservoirs and streams/drainages
- Subsurface sediments (0 to 36 inches) in Great Western Reservoir (IHSS 200)
- Surface water in reservoirs and streams/drainages
- Groundwater

The subsurface soil trench data were not used in the CDPHE Conservative Screen because the samples were primarily collected to characterize mobility of radionuclides in subsurface soil in support of the RI and other studies being conducted at RFETS. In addition, these were biased samples collected from a limited area of OU 3 and are not representative of the entire OU.

Because of the uncertainty regarding future use of Great Western Reservoir (IHSS 200), subsurface sediment data for IHSS 200 were included in the CDPHE Conservative Screen. The possibility exists that the reservoir could be drained. If Great Western Reservoir was drained, the potential exists for the construction of buildings or other facilities, and a receptor could be exposed to subsurface sediments at any depth interval as if the sediments were subsurface soil.

Subsurface sediments in Standley Lake (IHSS 201) and Mower Reservoir (IHSS 202) were not evaluated because it is unlikely either of these reservoirs will be drained in the future and, therefore, construction workers will not be exposed to subsurface sediments. Standley Lake is currently a source of drinking water and irrigation water; Mower Reservoir is privately owned and is used for agricultural purposes such as irrigation and water for livestock. No changes in use for either Standley Lake or Mower Reservoir are projected (DOE, 1993a).

Summary statistics (number of samples, detection frequency, minimum and maximum values, arithmetic mean, geometric mean, standard deviation, 95-percent upper confidence limit [UCL], and lognormal 95-percent UCL) for sediments, surface water, and groundwater analytes are provided in Appendix B (surface soil statistics are provided in TM4).

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2.2 METHODOLOGIES FOR STEP 1

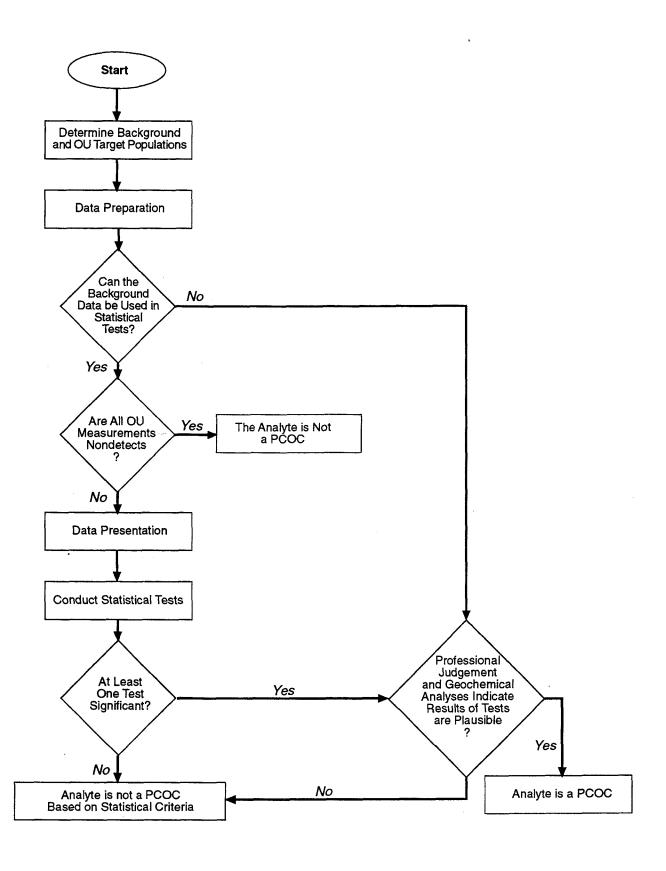
2.2.1 IHSS 199: Surface Soil

PCOCs for surface soil in OU 3 were identified using a statistical methodology for OU-to-back-ground comparisons (agreed upon by EPA, CDPHE, and DOE) that is based on site-specific guidance developed by Gilbert (1993). This methodology is outlined in Figure 2-1 and includes a data-presentation step and a series of statistical comparison tests that are performed for each analyte.

The statistical methodology includes the following tests:

- Hot-Measurement test-each OU 3 measurement is compared to a "hot measurement" value (i.e., upper tolerance limit calculated from the background data)
- Gehan test-used to determine if the medians of the two data sets are significantly different
- Quantile test-used to determine if the 80th percentiles of the two data sets are significantly different
- Slippage test-used to determine the number of OU 3 measurements that exceed the maximum background value
- t-test-used to determine if the means of the two data sets are significantly different.

The results of the statistical tests were used to determine if levels of chemicals in OU 3 are significantly elevated above background levels.



CDPHE = Colorado Department of Public Health and Environment

OU = Operable Unit

PCOC = Potential Chemical of Concern

Figure 2-1
FLOWCHART FOR COMPARING
OU 3 DATA TO BACKGROUND
CDPHE LETTER REPORT

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OU 3 surface soil data, including RFI/RI and Jefferson County Remedy Acres data (DOE, 1991a), and background data from the Rock Creek Area (DOE, 1993b) were used for Step 1 in the CDPHE Conservative Screen. Surface-soil samples were analyzed for radionuclides only (²⁴¹Am, ^{239/240}Pu, ^{233/234}U, ²³⁵U, and ²³⁸U).

2.2.2 IHSSs 200, 201, 202: Sediment, Surface Water, and Groundwater

After evaluating the OU 3 (IHSSs 200, 201, and 202) and background data sets for sediment, surface water, and groundwater (i.e., background data in the <u>Background Geochemical</u> Characterization Report [BGCR] [DOE, 1993c]), it was determined that the OU 3 and background data sets are not comparable for the purpose of rigorous statistical comparisons because the data sets represent different environmental conditions and flow regimes (e.g., OU 3 surface-water data are predominantly for reservoirs and the background surface-water data are for streams) (see TM 4 for details).

Literature benchmark data sets for sediment, surface water, and groundwater also were not considered appropriate for rigorous quantitative statistical comparisons because of small sample size and limited information about data quality.

Because the statistical background comparison methodology was not considered appropriate for sediment, surface water, and groundwater in IHSSs 200 through 202, an alternative approach for selecting PCOCs was used for these media (EPA, 1994a). The alternative approach is referred to as the "weight-of-evidence evaluation" because it relies on a series of data analyses (Figure 2-2).

Figure 2-2
WEIGHT-OF-EVIDENCE EVALUATIONS
CDPHE LETTER REPORT

PCOC = Potential Chemical of Concern

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The results of the analyses are considered together to assess whether levels of chemicals detected in OU 3 represent background conditions or contamination. The following analyses are included in the weight-of-evidence evaluation:

- Comparison of means, standard deviations, and ranges of OU 3 data to BGCR data (DOE, 1993c)
- Comparisons of means, standard deviations, and ranges of OU 3 data to literature benchmark data (comparisons to benchmark data were made using data presented in summary tables in Appendix B)
- Temporal analysis of data to identify seasonal variations or sampling anomalies
- Spatial analysis combined with the evaluation of physical processes affecting deposition and the evaluation of contribution of various water sources to OU 3 reservoirs
- Probability plot analyses to evaluate data populations (using PROBPLOT software)

In addition, a comparison was made to the Phase 1 Health Studies Materials of Concern (CDPHE, 1991a; CDPHE, 1991b; CDPHE, 1992) to confirm the identification or elimination of a chemical as a PCOC (See TM4, Section 3.10).

The data sets used in Step 1 for IHSSs 200 through 202 include the following:

- RFI/RI groundwater data (total metals, total radionuclides)
- RFI/RI sediment data (radionuclides, metals, cyanide, volatile organic compounds [VOCs] in IHSS 202 only)
- RFI/RI surface-water data (total metals, total radionuclides, VOCs in IHSS 202 only)

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- 1983/84 Sediment Investigations data (239/240 Pu in IHSS 200 and 201) (DOE, 1991b)
- Sediment, surface-water, and groundwater data from the BGCR (DOE, 1993c)
- Background data for sediments from Lowry Landfill Superfund Site (EPA, 1992a)
- Literature benchmark data for sediments from Rocky Mountain National Park lakes
 (Heit, et al., 1984) and Cherry Creek Reservoir (CCBA, 1994)
- Literature benchmark data for surface water from Colorado Front Range streams and lakes obtained from Arvada Department of Water and Environmental Quality (Arvada, 1994) and EPA's STORET database (EPA, 1993; EPA, 1994b)
- Literature benchmark data for groundwater (Dragun, 1988; Mathess, 1982).

An example of the weight-of-evidence evaluation for arsenic in sediments is presented in Subsection 3.9 of TM 4 and is provided in Appendix C of this document. This example explains each analysis, including PROBPLOT, used in the weight-of-evidence evaluations.

2.3 RESULTS

Table 2-2 lists PCOCs by medium and IHSS for OU 3 based on the methodologies described above. Brief discussions of the results presented in Table 2-2 are provided in the following subsections. Detailed discussions of the results of the statistical comparison tests for surface soil and the weight-of-evidence evaluations for sediment, surface water, and groundwater are provided in TM 4.

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TABLE 2-2 OU 3 POTENTIAL CHEMICALS OF CONCERN ROCKY FLATS ENVIRONMENTAL TECHNOLOGY SITE

Media	IHSS	PCOCs
Surface Soil	199	²⁴¹ Am
		^{239/240} Pu
	and the second s	
Surface Sediment (Grab Samples)	200 (Great Western Reservoir)	^{239/240} Pu
	201 (Standley Lake)	None
•	202 (Mower Reservoir)	None
Subsurface Sediments (Core Samples)	200 (Great Western Reservoir)	^{239/240} Pu
		Copper
Surface Water	200 (Great Western Reservoir)	None
	201 (Standley Lake)	None
	202 (Mower Reservoir)	None
Groundwater	200 (Great Western Reservoir)	Strontium
•	201 (Standley Lake)	None

Note: Potential chemicals of concern (PCOCs) are inorganic chemicals with detected concentrations above background levels or organic chemicals detected above reported detection limits.

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2.3.1 Surface Soil

The results of the background statistical comparison indicate ²⁴¹Am and ^{239/240}Pu are PCOCs for surface soil in OU 3. These two radionuclides were identified as PCOCs by more than one statistical test (i.e., Hot-Measurement test, Slippage test, Quantile test, and Gehan test for ²⁴¹Am and ^{239/240}Pu, and t-test for ^{239/240}Pu), and the pattern of ²⁴¹Am and ^{239/240}Pu activities in surface soil suggest that the reported levels are not attributable to background conditions. Uranium²³⁵ was not identified as a PCOC by any of the statistical tests. One statistical test (Hot-Measurement test) indicated ^{233/234}U and ²³⁸U may be PCOCs; however, after further spatial analysis of the pattern of activities for these two radionuclides, the observed distribution of activities was attributed to natural variation and was not indicative of contamination. Therefore, ^{233/234}U and ²³⁸U were not retained as PCOCs. TM 4 (Section 4.3) contains a detailed discussion of this spatial analysis.

2.3.2 Surface Sediments

Weight-of-evidence evaluations were performed for radionuclides, metals, and organic (IHSS 202 only) compounds in surface sediments. Results of these evaluations are summarized in the following subsections. Table 2-3 summarizes the results of the weight-of-evidence evaluations for all inorganic analytes in surface sediments. Columns 3 and 4 in Table 2-3 show comparisons of OU 3 data to BGCR stream-sediment data and benchmark data for lakes, respectively; mean and maximum values for the corresponding data sets were compared. Column 5 indicates if a spatial analysis of the chemical distribution suggests natural deposition or whether a trend indicates contamination. Column 6 reports whether a PROBPLOT analysis was performed; PROBPLOT is used to assess if more than one population is included within a data set. Details of PROBPLOT and the results for OU 3 are provided in TM 4. Column 7 contains comments, and Column 8 indicates if the chemical is carried through the CDPHE Conservative Screen (i.e., is identified as a PCOC).

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WEIGHT-OF-EVIDENCE EVALUATION SUMMARY OU 3 SURFACE SEDIMENTS (GRAB SAMPLES) ROCKY FLATS ENVIRONMENTAL TECHNOLOGY SITE

TABLE 2-3

	7			Comments	CN					NO Normal NO				ON		PHOBPLOT: One population. Contribution of highly mineralized sediments from Clear Creek. Mean and maximum Similar to benchmark data.		NO more in the second and was similar to benchmark data, indicative of normal background population.		ON				background and benchmark data, indicative of normal	background and benchmark data, indicative of normal	background and benchmark data, indicative of normal		. Dackground and benchmark data, indicative of normal NO		ON	ON :	ON S			
HOCKY FLATS ENVIRONMENTAL TECHNOLOGY SITE	•	PROBPLOT	Analysis?	NO	NO		YES	Š	253	YES		2		YES	background population.		YES PROBPLOT: One norulation, Mannaged M.			2	ON SES	FES PHUBPLOT: One population. Mean and Max similar to background and handbursed.	Packground population. YES PROBPLOT: One population.	background population. YES PROBEI OT: One accordance of normal visual and benchmark data, indicative of normal visual vi		res PHOBPLOT: One population. Mean and Max similar to background and benchmark data, indicative of normal background population	YES PROBPLOT: One population. Mean and Max elmifacts.	background population.	_		CN	ON ON	ON	ON	
4	•	ervolr	tlon				NA, <max no="" td="" trend<=""><td>NA,<max no="" td="" trend<=""><td></td><td>NA,<max no="" td="" trend<=""><td></td><td></td><td></td><td>SMEAN, ≥MAX No Trend</td><td><mean,>MAX No Trand</mean,></td><td></td><td><mean,>MAX No Trend</mean,></td><td>NA AMAY</td><td>NA.<max no="" td="" trend<=""><td></td><td>×</td><td></td><td><mean, <max="" no="" td="" trend<=""><td><mean,<max no="" td="" trend<=""><td>>MAX</td><td></td><td>>MAX No Trend</td><td>ON ON</td><td>>MEAN No Trend</td><td></td><td>Z</td><td></td><td></td><td>NA No Trend</td><td>5</td></mean,<max></td></mean,></td></max></td></max></td></max></td></max>	NA, <max no="" td="" trend<=""><td></td><td>NA,<max no="" td="" trend<=""><td></td><td></td><td></td><td>SMEAN, ≥MAX No Trend</td><td><mean,>MAX No Trand</mean,></td><td></td><td><mean,>MAX No Trend</mean,></td><td>NA AMAY</td><td>NA.<max no="" td="" trend<=""><td></td><td>×</td><td></td><td><mean, <max="" no="" td="" trend<=""><td><mean,<max no="" td="" trend<=""><td>>MAX</td><td></td><td>>MAX No Trend</td><td>ON ON</td><td>>MEAN No Trend</td><td></td><td>Z</td><td></td><td></td><td>NA No Trend</td><td>5</td></mean,<max></td></mean,></td></max></td></max></td></max>		NA, <max no="" td="" trend<=""><td></td><td></td><td></td><td>SMEAN, ≥MAX No Trend</td><td><mean,>MAX No Trand</mean,></td><td></td><td><mean,>MAX No Trend</mean,></td><td>NA AMAY</td><td>NA.<max no="" td="" trend<=""><td></td><td>×</td><td></td><td><mean, <max="" no="" td="" trend<=""><td><mean,<max no="" td="" trend<=""><td>>MAX</td><td></td><td>>MAX No Trend</td><td>ON ON</td><td>>MEAN No Trend</td><td></td><td>Z</td><td></td><td></td><td>NA No Trend</td><td>5</td></mean,<max></td></mean,></td></max></td></max>				SMEAN, ≥MAX No Trend	<mean,>MAX No Trand</mean,>		<mean,>MAX No Trend</mean,>	NA AMAY	NA. <max no="" td="" trend<=""><td></td><td>×</td><td></td><td><mean, <max="" no="" td="" trend<=""><td><mean,<max no="" td="" trend<=""><td>>MAX</td><td></td><td>>MAX No Trend</td><td>ON ON</td><td>>MEAN No Trend</td><td></td><td>Z</td><td></td><td></td><td>NA No Trend</td><td>5</td></mean,<max></td></mean,></td></max>		×		<mean, <max="" no="" td="" trend<=""><td><mean,<max no="" td="" trend<=""><td>>MAX</td><td></td><td>>MAX No Trend</td><td>ON ON</td><td>>MEAN No Trend</td><td></td><td>Z</td><td></td><td></td><td>NA No Trend</td><td>5</td></mean,<max></td></mean,>	<mean,<max no="" td="" trend<=""><td>>MAX</td><td></td><td>>MAX No Trend</td><td>ON ON</td><td>>MEAN No Trend</td><td></td><td>Z</td><td></td><td></td><td>NA No Trend</td><td>5</td></mean,<max>	>MAX		>MAX No Trend	ON ON	>MEAN No Trend		Z			NA No Trend	5
3	Background	Stream	Evaluation AMEAN AMAY	AMEAN AMAX		MEAN MAX	VCIAIC INC.	<mean,>MAX</mean,>		<mean,<max< th=""><th><pre><mean,<max< pre=""></mean,<max<></pre></th><th>WEAN, MAX</th><th>></th><th></th><th><mean,<max <me,<="" th=""><th>WEAN, OSC. MARAN</th><th></th><th><mean,<max< th=""><th></th><th></th><th></th><th></th><th><mean,<max <mea<="" th=""><th><mean,<max <mea<="" th=""><th><mean,<max< th=""><th>- WEANTOED MAY</th><th></th><th></th><th></th><th></th><th>O,>MAX</th><th>ND MEAN MAX</th><th>AMEAN, AMAX</th><th></th><th>Z</th></mean,<max<></th></mean,<max></th></mean,<max></th></mean,<max<></th></mean,<max></th></mean,<max<>	<pre><mean,<max< pre=""></mean,<max<></pre>	WEAN, MAX	>		<mean,<max <me,<="" th=""><th>WEAN, OSC. MARAN</th><th></th><th><mean,<max< th=""><th></th><th></th><th></th><th></th><th><mean,<max <mea<="" th=""><th><mean,<max <mea<="" th=""><th><mean,<max< th=""><th>- WEANTOED MAY</th><th></th><th></th><th></th><th></th><th>O,>MAX</th><th>ND MEAN MAX</th><th>AMEAN, AMAX</th><th></th><th>Z</th></mean,<max<></th></mean,<max></th></mean,<max></th></mean,<max<></th></mean,<max>	WEAN, OSC. MARAN		<mean,<max< th=""><th></th><th></th><th></th><th></th><th><mean,<max <mea<="" th=""><th><mean,<max <mea<="" th=""><th><mean,<max< th=""><th>- WEANTOED MAY</th><th></th><th></th><th></th><th></th><th>O,>MAX</th><th>ND MEAN MAX</th><th>AMEAN, AMAX</th><th></th><th>Z</th></mean,<max<></th></mean,<max></th></mean,<max></th></mean,<max<>					<mean,<max <mea<="" th=""><th><mean,<max <mea<="" th=""><th><mean,<max< th=""><th>- WEANTOED MAY</th><th></th><th></th><th></th><th></th><th>O,>MAX</th><th>ND MEAN MAX</th><th>AMEAN, AMAX</th><th></th><th>Z</th></mean,<max<></th></mean,<max></th></mean,<max>	<mean,<max <mea<="" th=""><th><mean,<max< th=""><th>- WEANTOED MAY</th><th></th><th></th><th></th><th></th><th>O,>MAX</th><th>ND MEAN MAX</th><th>AMEAN, AMAX</th><th></th><th>Z</th></mean,<max<></th></mean,<max>	<mean,<max< th=""><th>- WEANTOED MAY</th><th></th><th></th><th></th><th></th><th>O,>MAX</th><th>ND MEAN MAX</th><th>AMEAN, AMAX</th><th></th><th>Z</th></mean,<max<>	- WEANTOED MAY					O,>MAX	ND MEAN MAX	AMEAN, AMAX		Z
1 2		IHSS Chemical		201 241Am	202 241Am	200 Aluminum		201 Aluminum	000	200 Antimorn					201 Arsenic	202 Arsenic		200 Barium			200 Beryllium		201 Beryllium	202 Beryllium	200 Cadmium	201 Cadmium		202 Cadmium		202 Calcium					

EG&G ROCKY FLATS ENVIRONMENTAL TECHNOLOGY SITE CDPHE Conservative Screen for Operable Unit 3

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TABLE 2-3
WEIGHT-OF-EVIDENCE EVALUATION SUMMARY
OU 3 SURFACE SEDIMENTS (GRAB SAMPLES)
ROCKY FLATS ENVIRONMENTAL TECHNOLOGY SITE

8			PCOC?	ON N	Q.	ON	ON.	ON ON	ON ON	9	<u>Q</u>	<u>Q</u>	9	9	9	ON N	9	<u>N</u>	N N	ON.	ON O	ON O	O _N	ON.	9	ON.	<u>Q</u>	Q Q
		•	Commente	PROBPLOT: Two populations. Small slopes for both populations due to adsorption or precipitation, organic adsorption, or algal bioaccumulation.	PROBPLOT: One population. Mean and Max similar to background and benchmark data, indicative of normal background population.	PROBPLOT: Two populations. Small slopes for both populations due to adsorption or precipitation, organic adsorption, or algal bioaccumulation. Ataal blooms and varying phis were observed at Mower.	PHOBPLOT: One population. Mean and Max similar to background and benchmark data, indicative of normal background population.	PROBPLOT: One population. Mean and Max similar to background and benchmark data, indicative of normal background population.	PROBPLOT: One population. Mean and Max similar to background and benchmark data, indicative of normal background population.				Not Detected	Not Detected	Not Detected	PROBPLOT: One population. High iron concentrations typical for sediments from lacustrine environments. Means and medians for the three reservoirs are nearly the same.	PROBPLOT: One population. High iron concentrations typical for sediments from lacustrine environments. Means	PROBPLOT: One population. High iron concentrations typical for sediments from lacustrine environments. Means and medians for the three reservoirs are nearly the same.	PROBPLOT: One population. One sample exceeds 95 percentile concentration. Sample is located in deep portion of reservoir, rich in organic and fine grained material containing complex and adsorbed metals.	PROBPLOT: One population. Maximum concentration likely due to contribution from highly mineralized Clear Creek sediments.	PROBPLOT: One population. Mean and Max similar to background and benchmark data, indicative of normal background population.	PROBPLOT: One population. Mean and Max similar to background and benchmark data, indicative of normal background population.	PROBPLOT: One population. Maximum concentration likely due to the fact that lithium is a common constituent in micas, which are released by acid attack, a phenomenon that happens in mine waste areas such as Clear Creek, a source feeding IHSS 201.	PROBPLOT: One population. Mean and Max similar to background and benchmark data, indicative of normal background population.				PROBPLOT: One population. Mean and Max similar to background and benchmark data, indicative of normal background population.
9		PROBPLOT	Analysis7	YES	YES	YES	YES	YES	YES	o _N	8	8	Q	8	8	YES	YES	YES	YES	YES	YES	YES	YES	YES	9	<u>8</u>	<u>Q</u>	YES
5		Spatial	I rend ?	No Trend	No Trend	No Trend	No Trend	No Trend	No Trend	No Trend	No Trend	No Trend	Q	S	Q	No Trend	No Trend	No Trend	No Trend	No Trend	No Trend	No Trend	No Trend	No Trend	No Trend	No Trend	No Trend	No Trend
4		Benchmark Reservoir	Evaluation	¥Z	V	N.	NA, <max< td=""><td>NA,<max< td=""><td>NA,<max< td=""><td>NA,>MAX</td><td>NA,>MAX</td><td>NA,>MAX</td><td>QV</td><td>QN</td><td>S</td><td>>MEAN,>MAX</td><td>>MEAN,<max< td=""><td>>MEAN,<max< td=""><td><mean,>MAX</mean,></td><td>>MEAN,>MAX</td><td><mean,<max< td=""><td>٧X</td><td>V.</td><td>V</td><td>NA</td><td>Ν</td><td>NA</td><td>NA,>MAX</td></mean,<max<></td></max<></td></max<></td></max<></td></max<></td></max<>	NA, <max< td=""><td>NA,<max< td=""><td>NA,>MAX</td><td>NA,>MAX</td><td>NA,>MAX</td><td>QV</td><td>QN</td><td>S</td><td>>MEAN,>MAX</td><td>>MEAN,<max< td=""><td>>MEAN,<max< td=""><td><mean,>MAX</mean,></td><td>>MEAN,>MAX</td><td><mean,<max< td=""><td>٧X</td><td>V.</td><td>V</td><td>NA</td><td>Ν</td><td>NA</td><td>NA,>MAX</td></mean,<max<></td></max<></td></max<></td></max<></td></max<>	NA, <max< td=""><td>NA,>MAX</td><td>NA,>MAX</td><td>NA,>MAX</td><td>QV</td><td>QN</td><td>S</td><td>>MEAN,>MAX</td><td>>MEAN,<max< td=""><td>>MEAN,<max< td=""><td><mean,>MAX</mean,></td><td>>MEAN,>MAX</td><td><mean,<max< td=""><td>٧X</td><td>V.</td><td>V</td><td>NA</td><td>Ν</td><td>NA</td><td>NA,>MAX</td></mean,<max<></td></max<></td></max<></td></max<>	NA,>MAX	NA,>MAX	NA,>MAX	QV	QN	S	>MEAN,>MAX	>MEAN, <max< td=""><td>>MEAN,<max< td=""><td><mean,>MAX</mean,></td><td>>MEAN,>MAX</td><td><mean,<max< td=""><td>٧X</td><td>V.</td><td>V</td><td>NA</td><td>Ν</td><td>NA</td><td>NA,>MAX</td></mean,<max<></td></max<></td></max<>	>MEAN, <max< td=""><td><mean,>MAX</mean,></td><td>>MEAN,>MAX</td><td><mean,<max< td=""><td>٧X</td><td>V.</td><td>V</td><td>NA</td><td>Ν</td><td>NA</td><td>NA,>MAX</td></mean,<max<></td></max<>	<mean,>MAX</mean,>	>MEAN,>MAX	<mean,<max< td=""><td>٧X</td><td>V.</td><td>V</td><td>NA</td><td>Ν</td><td>NA</td><td>NA,>MAX</td></mean,<max<>	٧X	V.	V	NA	Ν	NA	NA,>MAX
3	Background		Evaluation	<mean,<max< td=""><td><mean,>MAX</mean,></td><td><mean+2sd,<max< td=""><td><mean+2sd,>MAX</mean+2sd,></td><td><mean,<max< td=""><td><mean,<max< td=""><td><mean+2sd,<max< td=""><td><mean+2sd,>MAX</mean+2sd,></td><td><mean,<max< td=""><td>Q</td><td>2</td><td>Q</td><td>>MEAN+2SD,>MAX</td><td><mean+2sd,<max< td=""><td><mean+2sd,<max< td=""><td><mean,<max< td=""><td><mean+2sd,<max< td=""><td><mean,<max< td=""><td><mean+2sd,<max< td=""><td><mean+2sd,>MAX</mean+2sd,></td><td><mean+2sd,<max< td=""><td><mean+2sd,<max< td=""><td><mean+2sd,>MAX</mean+2sd,></td><td><mean+2sd,<max< td=""><td><mean+2sd,<max< td=""></mean+2sd,<max<></td></mean+2sd,<max<></td></mean+2sd,<max<></td></mean+2sd,<max<></td></mean+2sd,<max<></td></mean,<max<></td></mean+2sd,<max<></td></mean,<max<></td></mean+2sd,<max<></td></mean+2sd,<max<></td></mean,<max<></td></mean+2sd,<max<></td></mean,<max<></td></mean,<max<></td></mean+2sd,<max<></td></mean,<max<>	<mean,>MAX</mean,>	<mean+2sd,<max< 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td=""><td><mean+2sd,<max< td=""><td><mean,<max< td=""><td><mean+2sd,<max< td=""><td><mean+2sd,>MAX</mean+2sd,></td><td><mean+2sd,<max< td=""><td><mean+2sd,<max< td=""><td><mean+2sd,>MAX</mean+2sd,></td><td><mean+2sd,<max< td=""><td><mean+2sd,<max< td=""></mean+2sd,<max<></td></mean+2sd,<max<></td></mean+2sd,<max<></td></mean+2sd,<max<></td></mean+2sd,<max<></td></mean,<max<></td></mean+2sd,<max<></td></mean,<max<></td></mean+2sd,<max<></td></mean+2sd,<max<>	<mean+2sd,<max< td=""><td><mean,<max< td=""><td><mean+2sd,<max< td=""><td><mean,<max< td=""><td><mean+2sd,<max< td=""><td><mean+2sd,>MAX</mean+2sd,></td><td><mean+2sd,<max< td=""><td><mean+2sd,<max< td=""><td><mean+2sd,>MAX</mean+2sd,></td><td><mean+2sd,<max< td=""><td><mean+2sd,<max< td=""></mean+2sd,<max<></td></mean+2sd,<max<></td></mean+2sd,<max<></td></mean+2sd,<max<></td></mean+2sd,<max<></td></mean,<max<></td></mean+2sd,<max<></td></mean,<max<></td></mean+2sd,<max<>	<mean,<max< td=""><td><mean+2sd,<max< td=""><td><mean,<max< 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td=""></mean+2sd,<max<></td></mean+2sd,<max<></td></mean+2sd,<max<></td></mean+2sd,<max<></td></mean+2sd,<max<></td></mean,<max<>	<mean+2sd,<max< td=""><td><mean+2sd,>MAX</mean+2sd,></td><td><mean+2sd,<max< td=""><td><mean+2sd,<max< td=""><td><mean+2sd,>MAX</mean+2sd,></td><td><mean+2sd,<max< td=""><td><mean+2sd,<max< td=""></mean+2sd,<max<></td></mean+2sd,<max<></td></mean+2sd,<max<></td></mean+2sd,<max<></td></mean+2sd,<max<>	<mean+2sd,>MAX</mean+2sd,>	<mean+2sd,<max< td=""><td><mean+2sd,<max< td=""><td><mean+2sd,>MAX</mean+2sd,></td><td><mean+2sd,<max< td=""><td><mean+2sd,<max< td=""></mean+2sd,<max<></td></mean+2sd,<max<></td></mean+2sd,<max<></td></mean+2sd,<max<>	<mean+2sd,<max< td=""><td><mean+2sd,>MAX</mean+2sd,></td><td><mean+2sd,<max< td=""><td><mean+2sd,<max< td=""></mean+2sd,<max<></td></mean+2sd,<max<></td></mean+2sd,<max<>	<mean+2sd,>MAX</mean+2sd,>	<mean+2sd,<max< td=""><td><mean+2sd,<max< td=""></mean+2sd,<max<></td></mean+2sd,<max<>	<mean+2sd,<max< td=""></mean+2sd,<max<>
2		10.11.040	Chemical	Chromium	Chromium	Chromium	Cobalt	Cobalt	Cobalt	Copper	Copper	Copper	Cyanide	Cyanide	Cyanide	Iron	Iron	Iron	Lead	Lead	Lead	Lithium	Lithium	Lithium	Magnesium	Magnesium	Magnesium	Manganese
-		9011	SSE	500	201	202	200	201	202	200	201	202	200	201	202	200	201	202	200	501	202	200	201	202	200	201	202	200

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TABLE 2-3
WEIGHT-OF-EVIDENCE EVALUATION SUMMARY
OU 3 SURFACE SEDIMENTS (GRAB SAMPLES)
ROCKY FLATS ENVIRONMENTAL TECHNOLOGY SITE

-	2	3	4	5	9	<u> </u>	8
		Background					
IHSS	Chemical	Stream Evaluation	Benchmark Reservoir Evaluation	Spatial Trend?	PROBPLOT Analysis?	Commante	60000
201	Manganese	>MEAN+2SD,>MAX	NA,>MAX	No Trend	YES	PROBPLOT: One population. High manganese concentrations probably reflect contribution from the highly mineralized Clear Creek sediments to Standley Lake.	ON
202	Manganese	<mean,<max< td=""><td>NA,>MAX</td><td>No Trend</td><td>YES</td><td>PROBPLOT: Two populations. Second population has a slope parallel to the lower population indicating a similar process forming both populations and the higher concentrations indicate an asymptotic character typical of the practical in an expense.</td><td>ON</td></mean,<max<>	NA,>MAX	No Trend	YES	PROBPLOT: Two populations. Second population has a slope parallel to the lower population indicating a similar process forming both populations and the higher concentrations indicate an asymptotic character typical of the practical in an expense.	ON
200	Mercury	9	<mean,>MAX</mean,>	No Trend	S S		Q.
201	Mercury	<mean,<max< td=""><td>>MEAN,>MAX</td><td>No Trend</td><td>YES</td><td>PROBPLOT: One population. Mean and Max similar to background and benchmark data, indicative of normal background population.</td><td>9</td></mean,<max<>	>MEAN,>MAX	No Trend	YES	PROBPLOT: One population. Mean and Max similar to background and benchmark data, indicative of normal background population.	9
202	Mercury	9	>MEAN.>MAX	No Trend	Q	Means VFRY similar to take background Insufficient number of defects to narform PRORPLOT	Ş
200	Molybdenum	<mean+2sd,>MAX</mean+2sd,>	NA, <max< td=""><td>No Trend</td><td>2</td><td></td><td>2 2</td></max<>	No Trend	2		2 2
201	Molybdenum	<mean,<max< td=""><td>NA,<max< td=""><td>No Trend</td><td>2</td><td></td><td>2</td></max<></td></mean,<max<>	NA, <max< td=""><td>No Trend</td><td>2</td><td></td><td>2</td></max<>	No Trend	2		2
202	Molybdenum	2	2	Q	S S		2
200	Nickel	<mean+2sd,<max< td=""><td><mean,<max< td=""><td>No Trend</td><td>YES</td><td>One sample exceeds 95th percentile concentration. This is the same location that has the highest conc. of Co, Mn and Fe. This is the result of Fe/Mn oxyhydroxide adsorption which elevates the Ni and Co concentrations through the adsorption process.</td><td>O.</td></mean,<max<></td></mean+2sd,<max<>	<mean,<max< td=""><td>No Trend</td><td>YES</td><td>One sample exceeds 95th percentile concentration. This is the same location that has the highest conc. of Co, Mn and Fe. This is the result of Fe/Mn oxyhydroxide adsorption which elevates the Ni and Co concentrations through the adsorption process.</td><td>O.</td></mean,<max<>	No Trend	YES	One sample exceeds 95th percentile concentration. This is the same location that has the highest conc. of Co, Mn and Fe. This is the result of Fe/Mn oxyhydroxide adsorption which elevates the Ni and Co concentrations through the adsorption process.	O.
201	Nickel	<mean,<max< td=""><td><mean,<max< td=""><td>No Trend</td><td>YES</td><td>PROBPLOT: One population. Mean and Max similar to background and benchmark data, indicative of normal background population.</td><td>8</td></mean,<max<></td></mean,<max<>	<mean,<max< td=""><td>No Trend</td><td>YES</td><td>PROBPLOT: One population. Mean and Max similar to background and benchmark data, indicative of normal background population.</td><td>8</td></mean,<max<>	No Trend	YES	PROBPLOT: One population. Mean and Max similar to background and benchmark data, indicative of normal background population.	8
202	Nickel	<mean,<max< td=""><td><mean,>MAX</mean,></td><td>No Trend</td><td>YES</td><td>PROBPLOT: One population. Mean and Max similar to background and benchmark data, indicative of normal</td><td>8</td></mean,<max<>	<mean,>MAX</mean,>	No Trend	YES	PROBPLOT: One population. Mean and Max similar to background and benchmark data, indicative of normal	8
						background population.	
200 200	Potassium	<mean+2sd,<max< td=""><td>NA,<max< td=""><td>No Trend</td><td>8</td><td></td><td><u>8</u></td></max<></td></mean+2sd,<max<>	NA, <max< td=""><td>No Trend</td><td>8</td><td></td><td><u>8</u></td></max<>	No Trend	8		<u>8</u>
201	Potassium	<mean+2sd,>MAX</mean+2sd,>	NA, <max< td=""><td>No Trend</td><td>ON ON</td><td></td><td>2</td></max<>	No Trend	ON ON		2
202	Potassium	<mean+2sd,<max< td=""><td>NA,<max< td=""><td>No Trend</td><td>8</td><td></td><td>2</td></max<></td></mean+2sd,<max<>	NA, <max< td=""><td>No Trend</td><td>8</td><td></td><td>2</td></max<>	No Trend	8		2
500	238Pu	NA	Ϋ́Α	Υ _N	8		2
201	238Pu	NA	NA	N/A	Š		Q.
202	236Pu	NA	NA	Α/N	Q.		2
200	239/240Pu	<mean,<max< td=""><td>>MAX</td><td>No Trend</td><td>YES</td><td>PROBPLOT: One population. Mean similar to background and benchmark data, indicative of normal background population.</td><td>YES</td></mean,<max<>	>MAX	No Trend	YES	PROBPLOT: One population. Mean similar to background and benchmark data, indicative of normal background population.	YES
201	239240Pu	<mean,<max< td=""><td>>MAX</td><td>No Trend</td><td>YES</td><td>PHOBPLOT: One population. Mean and Max similar to background and benchmark data, indicative of normal background population.</td><td>Ö</td></mean,<max<>	>MAX	No Trend	YES	PHOBPLOT: One population. Mean and Max similar to background and benchmark data, indicative of normal background population.	Ö
202	236/240Pu	<mean, <max<="" td=""><td>>MAX</td><td>No Trend</td><td>YES</td><td>PROBPLOT: One population.</td><td>2</td></mean,>	>MAX	No Trend	YES	PROBPLOT: One population.	2
200	2%Ra	<mean+2sd,<max< td=""><td>V</td><td>No Trend</td><td>YES</td><td>One sample exceeds the 95th percentile value for background population. This sample is the same sample that exceeds 95th perc. for ²³⁹²³4U, ²³5U, and ²³⁸U, suggesting natural uranium mineralization from the drainages rather than anthropodenic contam.</td><td>O_N</td></mean+2sd,<max<>	V	No Trend	YES	One sample exceeds the 95th percentile value for background population. This sample is the same sample that exceeds 95th perc. for ²³⁹²³ 4U, ²³ 5U, and ²³⁸ U, suggesting natural uranium mineralization from the drainages rather than anthropodenic contam.	O _N
201	226Ra	N/A	Ϋ́	Υ _N	YES	Insufficient detections to represent a statistically definable population.	Ç
202	226Ra	ΝA	ΝA	N/A	YES	Insufficient detections to represent a statistically definable population.	2
500	228Aa	NA	AA	No Trend	8		2
201	228Ra	NA	W	ΚX	2		9
202	228Ra	NA	N/A	N/A	S S		2
500	Selenium	<mean+2sd,<max< td=""><td><mean,>MAX</mean,></td><td>No Trend</td><td>ON N</td><td></td><td>2</td></mean+2sd,<max<>	<mean,>MAX</mean,>	No Trend	ON N		2
201	Selenium	<mean+2sd,<max< td=""><td><mean,>MAX</mean,></td><td>No Trend</td><td>Q N</td><td></td><td><u>8</u></td></mean+2sd,<max<>	<mean,>MAX</mean,>	No Trend	Q N		<u>8</u>
202	anium	Q	<mean,>MAX</mean,>	No Trend	O _N		NO NO

EG&G ROCKY FLATS ENVIRONMENTAL TECHNOLOGY SITE

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TABLE 2-3
WEIGHT-OF-EVIDENCE EVALUATION SUMMARY
OU 3 SURFACE SEDIMENTS (GRAB SAMPLES)
ROCKY FLATS ENVIRONMENTAL TECHNOLOGY SITE

PCOC? 2 ջ 2 ş 욧 Š 2 웆 Reservoir: Total Uranium only, PROBPLOT: One population. Mean and Max similar to background and benchmark Reservoir: Total Uranium only. PROBPLOT: One population. Mean and Max similar to background and benchmark Reservoir: Total Uranium only. PROBPLOT: One population. Mean and Max similar to background and benchmark Creek: BKGND MEAN & MAX > ONSITE MEAN & MAX BY 0.01, Reservoir: Total U only. PROBPLOT: One sample higher quartz content relative to mica content in each reservoir. Quartz is also readily available in mine waste near Max concentration less than 1% to an average crustal abundance of approx. 27%. Sediments in IHSS 201 have Reservoir: Total Uranium only. Mean and maximum similar to benchmark data, indicative of normal background ехсееds 95th percentile conc. This sample may represent a natural uranium mineralization from the drainages PROBPLOT: One population. Mean and Max similar to background and benchmark data, indicative of normal Creek: BKGND MAX > ONSITE MAX BY 0.01, Reservoir: Total Uranium only. Mean and maximum similar to Comments penchmark data, indicative of normal background population. Creek: N=4, Detection Frequency ≈ 50% Insufficient data to perform PROBPLOT Creek: n=6, 0.01 off of background Reservoir: Total Uranium only adjacent to the pediment. background population. Clear Creek drainage. Not Detected Not Detected Not Detected Not Detected population. PROBPLOT Analysis? YES Æ YES YES 2 YES No Trend Spatial Trend? No Trenc **₹** ₹ 2 2 ş 욷 S **Benchmark Reservoir** NA,<MAX NA,>MAX NA,<MAX NA,>MAX NA,>MAX NA NA NA NA NA Evaluation <MEAN <MAX <MAX ^MAX **△MAX** <MAX \$₩¥ ≨ ≨ <MEAN+2SD,>MAX <MEAN+2SD,>MAX <MEAN+2SD,<MAX <MEAN+2SD,<MAX <MEAN+2SD,<MAX <MEAN+2SD,<MAX <MEAN+2SD,<MAX >MEAN+2SD,>MAX <MEAN+2SD,<MAX <MEAN+2SD,>MAX >MEAN+2SD,>MAX <MEAN+2SD,>MAX <MEAN+2SD,<MAX MEAN+2SD, <MEAN+2SD,<MAX <MEAN,<MAX <MEAN,<MAX =MEAN,<MAX Background Stream <MEAN, <MAX <MEAN,<MAX <MEAN,<MAX <MEAN,<MAX <MEAN,<MAX <MEAN,>MAX Evaluation ₹ ≨ 읖 9 9 읃 Thallium Chemical Sodium Sodium 89990Sr Strontium Strontium Strontium **Thallium** Thallium 2337234U 233/234 Silicon Sodium Tritium Tritium Tritium Sowes Silver 89/80 Sr Silicon 르 ₽ 235∪ 235 235 2 드 HSS 88 202 200 8 202 201 200 8

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						. TABLE 2-3	
					WEIGHT-O OU 3 SUR ROCKY FLAT	WEIGHT-OF-EVIDENCE EVALUATION SUMMARY OU 3 SURFACE SEDIMENTS (GRAB SAMPLES) ROCKY FLATS ENVIRONMENTAL TECHNOLOGY SITE	
-	7	900	+	င	9		8
		Stream	Benchmark Reservoir	Spatial	PROBPLOT		
HSS	Chemical	Evaluation	Evaluation	Trend?	Analysis?	Comments	PCOC?
S) Per :	<mean,>MAX</mean,>	<mean< td=""><td>No Trend</td><td>ON ON</td><td>Reservoir: Total Uranium only</td><td>2</td></mean<>	No Trend	ON ON	Reservoir: Total Uranium only	2
88	ე ₈₆₂	<mean,<max< td=""><td><mean< td=""><td>No Trend</td><td>õ</td><td>Creek: BKGND MAX > ONSITE MAX BY 0.08, Reservoir: Total Uranium only</td><td>2</td></mean<></td></mean,<max<>	<mean< td=""><td>No Trend</td><td>õ</td><td>Creek: BKGND MAX > ONSITE MAX BY 0.08, Reservoir: Total Uranium only</td><td>2</td></mean<>	No Trend	õ	Creek: BKGND MAX > ONSITE MAX BY 0.08, Reservoir: Total Uranium only	2
80	Vanadium	<mean+2sd,>MAX</mean+2sd,>	<mean,<max< td=""><td>No Trend</td><td>ş</td><td></td><td>CZ</td></mean,<max<>	No Trend	ş		CZ
201	Vanadium	<mean,<max< td=""><td><mean,<max< td=""><td>No Trend</td><td>9</td><td></td><td>2</td></mean,<max<></td></mean,<max<>	<mean,<max< td=""><td>No Trend</td><td>9</td><td></td><td>2</td></mean,<max<>	No Trend	9		2
202	Vanadium	<mean+2sd,<max< td=""><td><mean,<max< td=""><td>No Trend</td><td>온</td><td></td><td>2</td></mean,<max<></td></mean+2sd,<max<>	<mean,<max< td=""><td>No Trend</td><td>온</td><td></td><td>2</td></mean,<max<>	No Trend	온		2
200	Zinc	<mean+2sd,<max< td=""><td>>MEAN+2SD,>MAX</td><td>No Trend</td><td>YES</td><td>PROBPLOT: One population. Sediment concentrations indicate overall influence of historical mining wastes and not</td><td>9</td></mean+2sd,<max<>	>MEAN+2SD,>MAX	No Trend	YES	PROBPLOT: One population. Sediment concentrations indicate overall influence of historical mining wastes and not	9
į	i					anthropogenic contamination on the sediments.	
201	Zinc	>MEAN+2SD,>MAX	>MEAN+2SD,>MAX	No Trend	YES	PROBPLOT: One population. Sediment concentrations indicate overall influence of historical mining wastes and not	8
cuc	Zino	VAICANI ANAV	WEANING CO.	1	,	anthropogenic contamination on the sediments.	
202	Zuic	<pre><imean,<imax< pre=""></imean,<imax<></pre>	<mean+2sd,>MAX</mean+2sd,>	No Irend	YES	PROBPLOT: One population. Sediment concentrations indicate overall influence of historical mining wastes and not enthropogenic contamination on the sediments.	Q N
Notes:	dividual Hospira	Notes: HSS - Individual Henerdonia Cubetonia Cube					
TON = CN	ND = Not detected	dous Substance Site.			Column 1: IHS	Column 1: INSS 200: Great Western Heservoir; IHSS 201: Standley Lake; IHSS 202: Mower Reservoir.	
N/A = Not	N/A ≈ Not analyzed in OU 3.	JU3.			Landfill Backo	Codum s. Companion to Co. Stream to Date(ground Geochemical Characterization Heport stream sediments data and Lowry Anniil] Background stream sediments date	
NA = Ben	NA = Benchmark data not available.	not available.			Column 4: Cor	Column 4: Comparison of OU 3 reservoir to benchmark literature lake data.	
*Chemica	*Chemical is an essential nutrient. 	al nutrient. Ilue is less than backgro	*Chemical is an essential nutrient. <mean 3="" =="" background="" benchmark="" is="" less="" mean="" or="" ou="" td="" than="" value="" value.<=""><td>alue,</td><td>Column 5: No associated wil</td><td>Column 5: No Trend = spatial analyses Indicates no contamination from RFP. Spatial distribution is consistent with physical properties associated with natural deposition.</td><td></td></mean>	alue,	Column 5: No associated wil	Column 5: No Trend = spatial analyses Indicates no contamination from RFP. Spatial distribution is consistent with physical properties associated with natural deposition.	
>Mean = <f></f>	OU 3 mean va)U 3 maximum	alue is greater than back value is less than back	>Mean ≈ OU 3 mean value is greater than background or benchmark mean value. <max 3="" =="" background="" benchmark="" is="" less="" maximum="" near="" or="" ou="" td="" than="" value="" value.<=""><td>n value. value.</td><td>Column 6: Yes Column 7: Dis</td><td>Column 6: Yes ≈ chemical was analyzed using PROBPLOT, No = not analyzed using PROBPLOT. Column 7: Discussion of weight-of-evidence results.</td><td></td></max>	n value. value.	Column 6: Yes Column 7: Dis	Column 6: Yes ≈ chemical was analyzed using PROBPLOT, No = not analyzed using PROBPLOT. Column 7: Discussion of weight-of-evidence results.	
>Max = C	>Max = OU 3 maximum MAX = maximum value.	ı value is greater than be	>Max ≈ 0U 3 maximum value is greater than background or benchmark maximum MAX ≈ maximum value.		Column 8: Yes	valus Column 8: Yes ≈ identified as a potential chemical of concern (PCOC), No ≈ not a PCOC.	
MEAN + 1	2SD = upper b	ound background mean	MEAN + 2SD = upper bound background mean (i.e., mean plus two standard deviations).	ard deviations	÷		

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2.3.2.1 Radionuclides

The results of the weight-of-evidence evaluations for Great Western Reservoir (IHSS 200) indicate ^{239/240}Pu is the only PCOC for surface sediments, based on the following:

- For IHSS 200, the mean and maximum values for ^{239/240}Pu in reservoir-sediment samples exceed corresponding mean and maximum benchmark values.
- The maximum value for IHSS 200 stream-sediment samples exceeds the maximum BGCR stream-sediment value.

Plutonium^{239/240} is not retained as a PCOC for IHSSs 201 and 202 for the following reasons:

- For IHSS 201, the mean value of ^{239/240}Pu in OU 3 reservoir-sediment samples was less than the benchmark values, and the mean and maximum values for OU 3 stream-sediment samples were less than corresponding mean and maximum BGCR stream-sediment values. In addition, the PROBPLOT analysis indicates the data set consists of only one population.
- For IHSS 202, the mean and maximum values for ^{239/240}Pu in OU 3 stream-sediment samples are less than corresponding mean and maximum BGCR stream-sediment values. In addition, the PROBPLOT analysis for IHSS 202 indicates the ^{239/240}Pu data set consists of only one population.

2.3.2.2 Metals

In general, mean and maximum OU 3 metal concentrations are less than background and benchmark values. Calcium and sodium concentrations are an exception. Also, for most metals, PROBPLOT identified only one population. Table 2-3 provides the detail information for each metal.

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The comparisons of OU 3 data to benchmark values indicate that mean concentrations of calcium in reservoir-sediment samples for IHSSs 200, 201, and 202 exceed benchmark upper bound mean values (i.e., mean plus two standard deviations). In IHSSs 200 and 201, maximum values of sodium in stream-sediment samples exceed maximum BGCR values; benchmark data for reservoirs were not available for comparison. Although both calcium and sodium have OU 3 concentrations exceeding background and benchmark data, they were not retained as PCOCs for the remaining steps of the CDPHE Conservative Screen because they are both considered to be essential human nutrients and are not evaluated for risk (EPA, 1989a). TM 4 includes a discussion of the elimination of five essential nutrients as COCs.

2.3.2.3 Organic Compounds

Six organic compounds were detected in sediment samples from IHSS 202 (Mower Reservoir): 2-butanone, acetone, methylene chloride, total xylenes, toluene, and trichlorotrifluoroethane. No other organic compounds were detected in sediment samples. The detected organic compounds were not retained as PCOCs for the reasons given below.

- 2-Butanone–Three of 12 samples were detects; all 3 detects were J-qualified, indicating that reported concentration is estimated (i.e., reported concentration is less than the contract-required detection limit, but greater than the instrument detection limit). 2-butanone is a common laboratory contaminant (EPA, 1988); therefore, low levels detected in samples may be due to contamination at the laboratory. Maximum detected value is 14.0 micrograms per kilogram (µg/kg).
- Acetone–Six of 15 samples were detects; 5 of the 6 detects were J-qualified; 2 of the 6 detects were B-qualified, indicating blank contamination problems. Acetone is a common laboratory contaminant (EPA, 1988). Maximum detected value is 47.0 µg/kg.

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- Methylene chloride–Three of 14 samples were detects; all detects were J-qualified.
 Methylene chloride is a common laboratory contaminant (EPA, 1988). Maximum detected value is 5.0 μg/kg.
- Total xylenes-One of 10 samples was a detect; the detect value was J-qualified.
 Maximum detected value is 2.0 µg/kg.
- Toluene–Three of 11 samples were detects; 2 of 3 detects were J-qualified. Toluene is a common laboratory contaminant (EPA, 1988). Maximum detected value is 16.0 µg/kg.
- Trichlorotrifluoroethane–Only one sample was analyzed for trichlorotrifluoroethane;
 the detected value was 50.0 μg/kg and was J- and B-qualified.

These six organic compounds detected in Mower Reservoir were not retained as PCOCs based on detection frequency, frequency of qualification (i.e., J-qualifier), low concentration levels, and the presence of some compounds in the corresponding blank samples (i.e., B-qualifier indicates "detects" represent contamination or laboratory artifacts). (Note: Laboratory blank data were not available to compare concentrations of organic compounds in the OU 3 samples to concentrations in the laboratory blanks.) This conclusion is supported by the Phase I Health Studies, which did not identify 2-butanone, acetone, total xylenes, toluene, or trichlorotrifluoroethane as materials of concern (CDPHE, 1992).

2.3.3 Subsurface Sediments

The results of the weight-of-evidence evaluations indicate ^{239/240}Pu and copper are PCOCs for subsurface sediments in Great Western Reservoir (IHSS 200), based on the following:

 The mean and maximum copper concentrations exceed the BGCR mean and maximum values; the maximum copper concentration exceeds the maximum benchmark value.

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 For IHSS 200, the mean and maximum values for ^{239/240}Pu in subsurface-sediment samples exceed corresponding mean and maximum benchmark values and BGCR stream-sediment values.

Table 2-4 summarizes the results of the weight-of-evidence evaluations for all analytes in Great Western Reservoir subsurface sediments. Columns 3 and 4 in Table 2-4 show comparisons of OU 3 data to background and benchmark data, respectively; mean and maximum values for the corresponding data sets were compared. Column 5 indicates if a spatial analysis was performed. Column 6 contains comments, and Column 7 indicates if the chemical is carried through the CDPHE Conservative Screen (i.e., is identified as a PCOC). No PROBPLOT analyses were performed for subsurface sediments.

2.3.4 Surface Water

No VOCs were detected in surface-water samples from IHSS 202 and, therefore, no organic PCOCs were identified for surface water. Based on the weight-of-evidence evaluations, no inorganic PCOCs were identified for surface water in IHSSs 200, 201, or 202. In general, OU 3 chemical mean and maximum values are less than corresponding background and benchmark values. Table 2-5 summarizes the results of the weight-of-evidence evaluations for all analytes in surface water. Columns 3 and 4 in Table 2-5 show comparisons of OU 3 data to background and benchmark data, respectively; mean and maximum values for the corresponding OU 3 and background/benchmark data sets were compared. Column 5 indicates if spatial analysis of the chemical distribution suggests natural deposition or contamination. Column 6 reports results of PROBPLOT analyses. Details of the PROBPLOT results for surface water are provided in TM 4. Column 7 contains comments, and Column 8 indicates if the chemical is carried through the CDPHE Conservative Screen (i.e., is identified as a PCOC).

2.3.5 Groundwater

The results of the weight-of-evidence evaluations indicate strontium is a PCOC for groundwater (IHSS 200 only) for the following reasons:

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TABLE 2-4

WEIGHT-OF-EVIDENCE EVALUATION SUMMARY
GREAT WESTERN RESERVOIR IHSS 200--SUBSURFACE SEDIMENT CORES
ROCKY FLATS ENVIRONMENTAL TECHNOLOGY SITE

	7			PCOC	Q	Q	Q	<u>o</u>	○	<u>o</u>	9	Q	<u>Q</u>	Q	ES	Q	Ş	NO NO	Ş	Ş	Ş	Ş	Ş	Ş	ON.
				A	_	~	~	_	~	_	~	_	-	_	>	_	_	_		_	_	-	-	_	_
OCCUPANTE	9			Comments											Spatial Analysis: Highest concentrations observed at approximately 24-26 inches (SED08692 AND SED09192), corresponding to a time of deposition circa 1964 (Wolaver and Burger, 1994).										
FLATS ENVIRONMENTAL TECHNOLOGY SITE	2	Spatial	Analysis	Performed?	ON	8	9	8	02	9	<u>Q</u>	9	9	9		Q N	9	Q Q	Q.	9	Q.	9	9	Q.	Q Q
SEIVINGIAIN	:			Pe																					
HOORI FEAT	4		Benchmark Lake Subsurface	Sediments Evaluation	AN	NA	>MEAN	NA VA	<mean< th=""><th>>MEAN</th><th>>MEAN</th><th>NA V</th><th>AN</th><th>NA</th><th>Ν</th><th>QN</th><th>>MEAN</th><th>>MEAN</th><th>V.</th><th>٧N</th><th>٧N</th><th>>MEAN</th><th>٧Z</th><th>>MEAN</th><th>٧Z</th></mean<>	>MEAN	>MEAN	NA V	AN	NA	Ν	QN	>MEAN	>MEAN	V.	٧N	٧N	>MEAN	٧Z	>MEAN	٧Z
	ဇာ	Background-Creek and	Lake Surface Sediments	Evaluation	<mean+2sd,>MAX</mean+2sd,>	<mean,<max< th=""><th><mean,<max< th=""><th><mean,<max< th=""><th><mean+ 2sd,="" <max<="" th=""><th><mean,<max< th=""><th><mean+2sd,<max< th=""><th><mean,<max< th=""><th><mean+2sd,<max< th=""><th><mean+2sd,<max< th=""><th>>MEAN+2SD>MAX</th><th>QN</th><th><mean+2sd,<max< th=""><th><mean+2sd,<max< th=""><th><mean+2sd,<max< th=""><th><mean+2sd,<max< th=""><th><mean+2sd,<max< th=""><th><mean+2sd,>MAX</mean+2sd,></th><th><mean,<max< th=""><th><mean +="" 2sd,<max<="" th=""><th><mean+2sd,<max< th=""></mean+2sd,<max<></th></mean></th></mean,<max<></th></mean+2sd,<max<></th></mean+2sd,<max<></th></mean+2sd,<max<></th></mean+2sd,<max<></th></mean+2sd,<max<></th></mean+2sd,<max<></th></mean+2sd,<max<></th></mean,<max<></th></mean+2sd,<max<></th></mean,<max<></th></mean+></th></mean,<max<></th></mean,<max<></th></mean,<max<>	<mean,<max< th=""><th><mean,<max< th=""><th><mean+ 2sd,="" <max<="" th=""><th><mean,<max< th=""><th><mean+2sd,<max< th=""><th><mean,<max< th=""><th><mean+2sd,<max< th=""><th><mean+2sd,<max< th=""><th>>MEAN+2SD>MAX</th><th>QN</th><th><mean+2sd,<max< th=""><th><mean+2sd,<max< th=""><th><mean+2sd,<max< th=""><th><mean+2sd,<max< th=""><th><mean+2sd,<max< th=""><th><mean+2sd,>MAX</mean+2sd,></th><th><mean,<max< th=""><th><mean +="" 2sd,<max<="" th=""><th><mean+2sd,<max< th=""></mean+2sd,<max<></th></mean></th></mean,<max<></th></mean+2sd,<max<></th></mean+2sd,<max<></th></mean+2sd,<max<></th></mean+2sd,<max<></th></mean+2sd,<max<></th></mean+2sd,<max<></th></mean+2sd,<max<></th></mean,<max<></th></mean+2sd,<max<></th></mean,<max<></th></mean+></th></mean,<max<></th></mean,<max<>	<mean,<max< th=""><th><mean+ 2sd,="" <max<="" th=""><th><mean,<max< th=""><th><mean+2sd,<max< th=""><th><mean,<max< th=""><th><mean+2sd,<max< th=""><th><mean+2sd,<max< th=""><th>>MEAN+2SD>MAX</th><th>QN</th><th><mean+2sd,<max< th=""><th><mean+2sd,<max< th=""><th><mean+2sd,<max< th=""><th><mean+2sd,<max< th=""><th><mean+2sd,<max< th=""><th><mean+2sd,>MAX</mean+2sd,></th><th><mean,<max< th=""><th><mean +="" 2sd,<max<="" th=""><th><mean+2sd,<max< th=""></mean+2sd,<max<></th></mean></th></mean,<max<></th></mean+2sd,<max<></th></mean+2sd,<max<></th></mean+2sd,<max<></th></mean+2sd,<max<></th></mean+2sd,<max<></th></mean+2sd,<max<></th></mean+2sd,<max<></th></mean,<max<></th></mean+2sd,<max<></th></mean,<max<></th></mean+></th></mean,<max<>	<mean+ 2sd,="" <max<="" th=""><th><mean,<max< th=""><th><mean+2sd,<max< th=""><th><mean,<max< th=""><th><mean+2sd,<max< th=""><th><mean+2sd,<max< th=""><th>>MEAN+2SD>MAX</th><th>QN</th><th><mean+2sd,<max< th=""><th><mean+2sd,<max< th=""><th><mean+2sd,<max< th=""><th><mean+2sd,<max< th=""><th><mean+2sd,<max< th=""><th><mean+2sd,>MAX</mean+2sd,></th><th><mean,<max< th=""><th><mean +="" 2sd,<max<="" th=""><th><mean+2sd,<max< th=""></mean+2sd,<max<></th></mean></th></mean,<max<></th></mean+2sd,<max<></th></mean+2sd,<max<></th></mean+2sd,<max<></th></mean+2sd,<max<></th></mean+2sd,<max<></th></mean+2sd,<max<></th></mean+2sd,<max<></th></mean,<max<></th></mean+2sd,<max<></th></mean,<max<></th></mean+>	<mean,<max< th=""><th><mean+2sd,<max< th=""><th><mean,<max< th=""><th><mean+2sd,<max< th=""><th><mean+2sd,<max< th=""><th>>MEAN+2SD>MAX</th><th>QN</th><th><mean+2sd,<max< th=""><th><mean+2sd,<max< th=""><th><mean+2sd,<max< th=""><th><mean+2sd,<max< th=""><th><mean+2sd,<max< th=""><th><mean+2sd,>MAX</mean+2sd,></th><th><mean,<max< th=""><th><mean +="" 2sd,<max<="" th=""><th><mean+2sd,<max< th=""></mean+2sd,<max<></th></mean></th></mean,<max<></th></mean+2sd,<max<></th></mean+2sd,<max<></th></mean+2sd,<max<></th></mean+2sd,<max<></th></mean+2sd,<max<></th></mean+2sd,<max<></th></mean+2sd,<max<></th></mean,<max<></th></mean+2sd,<max<></th></mean,<max<>	<mean+2sd,<max< th=""><th><mean,<max< th=""><th><mean+2sd,<max< th=""><th><mean+2sd,<max< th=""><th>>MEAN+2SD>MAX</th><th>QN</th><th><mean+2sd,<max< th=""><th><mean+2sd,<max< th=""><th><mean+2sd,<max< th=""><th><mean+2sd,<max< th=""><th><mean+2sd,<max< th=""><th><mean+2sd,>MAX</mean+2sd,></th><th><mean,<max< th=""><th><mean +="" 2sd,<max<="" th=""><th><mean+2sd,<max< th=""></mean+2sd,<max<></th></mean></th></mean,<max<></th></mean+2sd,<max<></th></mean+2sd,<max<></th></mean+2sd,<max<></th></mean+2sd,<max<></th></mean+2sd,<max<></th></mean+2sd,<max<></th></mean+2sd,<max<></th></mean,<max<></th></mean+2sd,<max<>	<mean,<max< th=""><th><mean+2sd,<max< th=""><th><mean+2sd,<max< th=""><th>>MEAN+2SD>MAX</th><th>QN</th><th><mean+2sd,<max< th=""><th><mean+2sd,<max< th=""><th><mean+2sd,<max< th=""><th><mean+2sd,<max< th=""><th><mean+2sd,<max< th=""><th><mean+2sd,>MAX</mean+2sd,></th><th><mean,<max< th=""><th><mean +="" 2sd,<max<="" th=""><th><mean+2sd,<max< th=""></mean+2sd,<max<></th></mean></th></mean,<max<></th></mean+2sd,<max<></th></mean+2sd,<max<></th></mean+2sd,<max<></th></mean+2sd,<max<></th></mean+2sd,<max<></th></mean+2sd,<max<></th></mean+2sd,<max<></th></mean,<max<>	<mean+2sd,<max< th=""><th><mean+2sd,<max< th=""><th>>MEAN+2SD>MAX</th><th>QN</th><th><mean+2sd,<max< th=""><th><mean+2sd,<max< th=""><th><mean+2sd,<max< th=""><th><mean+2sd,<max< th=""><th><mean+2sd,<max< th=""><th><mean+2sd,>MAX</mean+2sd,></th><th><mean,<max< th=""><th><mean +="" 2sd,<max<="" th=""><th><mean+2sd,<max< th=""></mean+2sd,<max<></th></mean></th></mean,<max<></th></mean+2sd,<max<></th></mean+2sd,<max<></th></mean+2sd,<max<></th></mean+2sd,<max<></th></mean+2sd,<max<></th></mean+2sd,<max<></th></mean+2sd,<max<>	<mean+2sd,<max< th=""><th>>MEAN+2SD>MAX</th><th>QN</th><th><mean+2sd,<max< th=""><th><mean+2sd,<max< th=""><th><mean+2sd,<max< th=""><th><mean+2sd,<max< th=""><th><mean+2sd,<max< th=""><th><mean+2sd,>MAX</mean+2sd,></th><th><mean,<max< th=""><th><mean +="" 2sd,<max<="" th=""><th><mean+2sd,<max< th=""></mean+2sd,<max<></th></mean></th></mean,<max<></th></mean+2sd,<max<></th></mean+2sd,<max<></th></mean+2sd,<max<></th></mean+2sd,<max<></th></mean+2sd,<max<></th></mean+2sd,<max<>	>MEAN+2SD>MAX	QN	<mean+2sd,<max< th=""><th><mean+2sd,<max< th=""><th><mean+2sd,<max< th=""><th><mean+2sd,<max< th=""><th><mean+2sd,<max< th=""><th><mean+2sd,>MAX</mean+2sd,></th><th><mean,<max< th=""><th><mean +="" 2sd,<max<="" th=""><th><mean+2sd,<max< th=""></mean+2sd,<max<></th></mean></th></mean,<max<></th></mean+2sd,<max<></th></mean+2sd,<max<></th></mean+2sd,<max<></th></mean+2sd,<max<></th></mean+2sd,<max<>	<mean+2sd,<max< th=""><th><mean+2sd,<max< th=""><th><mean+2sd,<max< th=""><th><mean+2sd,<max< th=""><th><mean+2sd,>MAX</mean+2sd,></th><th><mean,<max< th=""><th><mean +="" 2sd,<max<="" th=""><th><mean+2sd,<max< 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th=""><th><mean+2sd,<max< th=""></mean+2sd,<max<></th></mean></th></mean,<max<>	<mean +="" 2sd,<max<="" th=""><th><mean+2sd,<max< th=""></mean+2sd,<max<></th></mean>	<mean+2sd,<max< th=""></mean+2sd,<max<>
	7			Chemical	241Am	Aluminum	Arsenic	Barium	Beryllium	Cadmium	Calcium	Cesium	Chromium	Cobalt	Copper	Cyanide	Iron	Lead	Lithium	Magnesium	Manganese	Mercury	Molybdenum	Nickel	Potassium
	-			SSHI	200	200	200	200	500	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200

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CDPHE Conservative Screen

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TABLE 2-4

GREAT WESTERN RESERVOIR IHSS 200--SUBSURFACE SEDIMENT CORES WEIGHT-OF-EVIDENCE EVALUATION SUMMARY

ROCKY FLATS ENVIRONMENTAL TECHNOLOGY SITE

-	8	3	4	ıcı	9	7
		Background-Creek and		Spatial		
		Lake Surface Sediments	Benchmark Lake Subsurface	Analysis		
IHSS	Chemical	Evaluation	Sediments Evaluation	Performed?	Comments	PCOC
200	239/240Pu	<mean+2sd,>MAX</mean+2sd,>	>MAX	2		YES
200	Selenium	<mean +2sd,<max<="" td=""><td><mean< td=""><td>9</td><td></td><td>ON</td></mean<></td></mean>	<mean< td=""><td>9</td><td></td><td>ON</td></mean<>	9		ON
200	Silver	<mean+2sd,>MAX</mean+2sd,>	NA	S S		ON
200	Sodium	<mean,<max< td=""><td>Y.</td><td>8</td><td></td><td>ON</td></mean,<max<>	Y.	8		ON
200	Strontium	<mean+2sd,<max< td=""><td>NA</td><td><u>8</u></td><td></td><td>ON</td></mean+2sd,<max<>	NA	<u>8</u>		ON
200	Thallium	QN	QN	2		ON
200	Ę	<mean,<max< td=""><td>NA</td><td>8</td><td></td><td>ON</td></mean,<max<>	NA	8		ON
200	233/234	<mean,<max< td=""><td><max< td=""><td><u>8</u></td><td>Creek Maximums Similar</td><td>ON</td></max<></td></mean,<max<>	<max< td=""><td><u>8</u></td><td>Creek Maximums Similar</td><td>ON</td></max<>	<u>8</u>	Creek Maximums Similar	ON
200	235U	<mean,>MAX</mean,>	<max< td=""><td>8</td><td>Creek Maximums Similar</td><td>ON</td></max<>	8	Creek Maximums Similar	ON
200	236U	<mean,<max< td=""><td><max< td=""><td>Q.</td><td></td><td>ON</td></max<></td></mean,<max<>	<max< td=""><td>Q.</td><td></td><td>ON</td></max<>	Q.		ON
200	Vanadium	<mean +="" 2sd,="" <max<="" td=""><td>>MEAN</td><td>9</td><td></td><td>ON</td></mean>	>MEAN	9		ON
200	Zinc	<mean+2sd,<max< td=""><td>>MEAN</td><td>9</td><td></td><td>ON</td></mean+2sd,<max<>	>MEAN	9		ON

IHSS - Individual Hazardous Substance Site.

ND = Not detected.

N/A = Not analyzed in OU 3.

NA = Benchmark data not available.

*Chemical is an essential nutrient.

<Mean = OU 3 mean value is less than background or benchmark mean value.</p>

>Mean = OU 3 mean value is greater than background or benchmark mean value.

>Max = OU 3 maximum value is greater than background or benchmark maximum value. <Max = OU 3 maximum value is less than background or benchmark maximum value.</p>

MEAN + 2SD = upper bound background mean (i.e., mean plus two standard deviations). MAX = maximum value.

stream sediments data (DOE, 1993c), Lowry Landfill Surface Stream Sediment data (EPA, 1992a), Column 3: Comparison of OU 3 reservoir to Background Geochemical Characterization Report benchmark lake surface sediment data (CCBA, 1994).

Column 4: Comparison of OU 3 reservoir to benchmark lake subsurface sediment data (Heit, 1984; Cohen et al., 1990)

Column 5: N = No spatial analysis performed, y = spatial analysis performed.

Column 6: Discussion of weight-of-evidence evaluation.

Column 7: Yes = identified as a potential chemical of concern (PCOC), No = not a PCOC.





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TABLE 2-5

WEIGHT-OF-EVIDENCE EVALUATION SUMMARY OU3 SURFACE WATER ROCKY FLATS ENVIRONMENTAL TECHNOLOGY SITE

1	2	3	4	5	6	7	8
			Benchark	Spatial			
IHSS	Chemical	BGCR Evaluation	Evaluation	Analysis	PROBPLOT	Comments	PCOC?
200	Aluminum	<mean +="" 2sd,="" max<="" td=""><td>>MEAN,MAX</td><td>No Trend</td><td>Not Eval.</td><td></td><td>NO</td></mean>	>MEAN,MAX	No Trend	Not Eval.		NO
201	Aluminum	<mean,max< td=""><td><mean,max< td=""><td>No Trend</td><td>Not Eval.</td><td></td><td>NO</td></mean,max<></td></mean,max<>	<mean,max< td=""><td>No Trend</td><td>Not Eval.</td><td></td><td>NO</td></mean,max<>	No Trend	Not Eval.		NO
202	Aluminum	<mean, max<="" td=""><td><mean,max< td=""><td>No Trend</td><td>Not Eval.</td><td></td><td>NO</td></mean,max<></td></mean,>	<mean,max< td=""><td>No Trend</td><td>Not Eval.</td><td></td><td>NO</td></mean,max<>	No Trend	Not Eval.		NO
200	²⁴¹ Am	<mean +="" 2sd,="" max<="" td=""><td><mean,max< td=""><td>No Trend</td><td>Not Eval.</td><td></td><td>NO</td></mean,max<></td></mean>	<mean,max< td=""><td>No Trend</td><td>Not Eval.</td><td></td><td>NO</td></mean,max<>	No Trend	Not Eval.		NO
201	²⁴¹ Am	<mean +="" 2sd,="" max<="" td=""><td><mean,max< td=""><td>No Trend</td><td>Not Eval.</td><td></td><td>NO</td></mean,max<></td></mean>	<mean,max< td=""><td>No Trend</td><td>Not Eval.</td><td></td><td>NO</td></mean,max<>	No Trend	Not Eval.		NO
202	²⁴¹ Am	<mean +="" 2sd,="" max<="" td=""><td><mean,max< td=""><td>No Trend</td><td>Not Eval.</td><td></td><td>NO</td></mean,max<></td></mean>	<mean,max< td=""><td>No Trend</td><td>Not Eval.</td><td></td><td>NO</td></mean,max<>	No Trend	Not Eval.		NO
200	Antimony	ND	ND	ND	Not Eval.		NO
201	Antimony	ND	ND	ND	Not Eval.		NO
202	Antimony	ND	ND	ND	Not Eval.		NO
200	Arsenic	MEAN,MAX	<max< td=""><td>No Trend</td><td>1 Population</td><td></td><td>NO</td></max<>	No Trend	1 Population		NO
201	Arsenic	ND	ND	No Trend	1 Population		NO
202	Arsenic	~MEAN + 2SD,>MAX	<max< td=""><td>No Trend</td><td>1 Population</td><td></td><td>NO</td></max<>	No Trend	1 Population		NO
200	Barium	<mean,max< td=""><td><mean,max< td=""><td>No Trend</td><td>Not Eval.</td><td></td><td>NO</td></mean,max<></td></mean,max<>	<mean,max< td=""><td>No Trend</td><td>Not Eval.</td><td></td><td>NO</td></mean,max<>	No Trend	Not Eval.		NO
201	Barium	<mean,max< td=""><td><mean,max< td=""><td>No Trend</td><td>Not Eval.</td><td></td><td>NO</td></mean,max<></td></mean,max<>	<mean,max< td=""><td>No Trend</td><td>Not Eval.</td><td></td><td>NO</td></mean,max<>	No Trend	Not Eval.		NO
202	Barium	<mean,max< td=""><td><mean,max< td=""><td>No Trend</td><td>Not Eval.</td><td></td><td>NO</td></mean,max<></td></mean,max<>	<mean,max< td=""><td>No Trend</td><td>Not Eval.</td><td></td><td>NO</td></mean,max<>	No Trend	Not Eval.		NO
200	Beryllium	<mean,max< td=""><td>NA</td><td>No Trend</td><td>Not Eval.</td><td></td><td>NO</td></mean,max<>	NA	No Trend	Not Eval.		NO
201	Beryllium	<mean,max< td=""><td>NA</td><td>No Trend</td><td>Not Eval.</td><td></td><td>NO</td></mean,max<>	NA	No Trend	Not Eval.		NO
202	Beryllium	ND	ND	ND	Not Eval.		NO
200	Cadmium	<mean.max< td=""><td><max< td=""><td>No Trend</td><td>Not Eval.</td><td></td><td>NO</td></max<></td></mean.max<>	<max< td=""><td>No Trend</td><td>Not Eval.</td><td></td><td>NO</td></max<>	No Trend	Not Eval.		NO
201	Cadmium	<mean,max< td=""><td><max< td=""><td>No Trend</td><td>Not Eval.</td><td></td><td>NO</td></max<></td></mean,max<>	<max< td=""><td>No Trend</td><td>Not Eval.</td><td></td><td>NO</td></max<>	No Trend	Not Eval.		NO
202	Cadmium	<mean,>MAX</mean,>	>MAX	No Trend	Not Eval.		NO
200	Calcium	<mean,max< td=""><td><mean,max< td=""><td>No Trend</td><td>Not Eval.</td><td></td><td>NO</td></mean,max<></td></mean,max<>	<mean,max< td=""><td>No Trend</td><td>Not Eval.</td><td></td><td>NO</td></mean,max<>	No Trend	Not Eval.		NO
201	Calcium	<mean,max< td=""><td><mean,max< td=""><td>No Trend</td><td>Not Eval.</td><td></td><td>NO</td></mean,max<></td></mean,max<>	<mean,max< td=""><td>No Trend</td><td>Not Eval.</td><td></td><td>NO</td></mean,max<>	No Trend	Not Eval.		NO
202	Calcium	<mean,max< td=""><td><mean,max< td=""><td>No Trend</td><td>Not Eval.</td><td></td><td>NO</td></mean,max<></td></mean,max<>	<mean,max< td=""><td>No Trend</td><td>Not Eval.</td><td></td><td>NO</td></mean,max<>	No Trend	Not Eval.		NO
200	Cesium	<mean,max< td=""><td>NA</td><td>No Trend</td><td>Not Eval.</td><td></td><td>NO</td></mean,max<>	NA	No Trend	Not Eval.		NO
201	Cesium	ND	ND	ND	Not Eval.		NO
202	Cesium	<mean,max< td=""><td>NA</td><td>No Trend</td><td>Not Eval.</td><td></td><td>NO</td></mean,max<>	NA	No Trend	Not Eval.		NO
200	Chromium	<mean,max< td=""><td><mean,max< td=""><td>No Trend</td><td>Not Eval.</td><td></td><td>NO</td></mean,max<></td></mean,max<>	<mean,max< td=""><td>No Trend</td><td>Not Eval.</td><td></td><td>NO</td></mean,max<>	No Trend	Not Eval.		NO
201	Chromium	<mean,max< td=""><td><mean,max< td=""><td>No Trend</td><td>Not Eval.</td><td></td><td>NO</td></mean,max<></td></mean,max<>	<mean,max< td=""><td>No Trend</td><td>Not Eval.</td><td></td><td>NO</td></mean,max<>	No Trend	Not Eval.		NO
202	Chromium	<mean +="" 2sd,="">MAX</mean>	>MEAN,MAX	No Trend	Not Eval.	1 anomalous	NO
200	Cobalt	AND AND MANY	- MEAN MAY	No Trend	Net Fuel	value	NO
201	Cobalt	<mean,max <mean,max< td=""><td>>MEAN,<max< td=""><td>No Trend</td><td>Not Eval. Not Eval.</td><td></td><td>NO</td></max<></td></mean,max<></mean,max 	>MEAN, <max< td=""><td>No Trend</td><td>Not Eval. Not Eval.</td><td></td><td>NO</td></max<>	No Trend	Not Eval. Not Eval.		NO
202	Cobait	<ivi≧ain,iviaa ND</ivi≧ain,iviaa 	<mean,max ND</mean,max 	NO Trend ND	Not Eval.		NO
202			<max< td=""><td>No Trend</td><td>Not Eval.</td><td></td><td>NO</td></max<>	No Trend	Not Eval.		NO
	Copper	<mean +="" 2sd,="">MAX</mean>		No Trend	Not Eval.		NO
201	Copper	<mean +="" 2sd,="">MAX</mean>	<max< td=""><td></td><td></td><td></td><td>NO</td></max<>				NO
202 200	Copper	<mean,max ND</mean,max 	<max ND</max 	No Trend ND	Not Eval. Not Eval.		NO NO
	Cyanide		NA NA	טא No Trend		1 detect out of 16	NO
201 202	Cyanide	<mean +="" 2sd,="">MAX</mean>		No Frena ND	Not Eval.	1 detect out of 16	NO NO
	Cyanide	ND MEANIMAY	ND		Not Eval.		
200	Iron	<mean,max< td=""><td>>MEAN,MAX</td><td>No Trend</td><td>1 Population</td><td></td><td>NO</td></mean,max<>	>MEAN,MAX	No Trend	1 Population		NO

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TABLE 2-5

WEIGHT-OF-EVIDENCE EVALUATION SUMMARY OU3 SURFACE WATER ROCKY FLATS ENVIRONMENTAL TECHNOLOGY SITE

1	2	3	4	5	6	7	8
			Benchark	Spatial	-	-	_
IHSS	Chemical	BGCR Evaluation	Evaluation	Analysis	PROBPLOT	Comments	PCOC?
201	Iron	<mean,max< td=""><td><mean,max< td=""><td>No Trend</td><td>1 Population</td><td></td><td>NO</td></mean,max<></td></mean,max<>	<mean,max< td=""><td>No Trend</td><td>1 Population</td><td></td><td>NO</td></mean,max<>	No Trend	1 Population		NO
202	Iron	<mean,max< td=""><td><mean,max< td=""><td>No Trend</td><td>1 Population</td><td></td><td>NO</td></mean,max<></td></mean,max<>	<mean,max< td=""><td>No Trend</td><td>1 Population</td><td></td><td>NO</td></mean,max<>	No Trend	1 Population		NO
200	Lead	<mean +="" 2sd,<max<="" td=""><td><mean,max< td=""><td>No Trend</td><td>1 Population</td><td></td><td>NO</td></mean,max<></td></mean>	<mean,max< td=""><td>No Trend</td><td>1 Population</td><td></td><td>NO</td></mean,max<>	No Trend	1 Population		NO
201	Lead	<mean +="" 2sd,max<="" td=""><td><mean.max< td=""><td>No Trend</td><td>1 Population</td><td></td><td>NO</td></mean.max<></td></mean>	<mean.max< td=""><td>No Trend</td><td>1 Population</td><td></td><td>NO</td></mean.max<>	No Trend	1 Population		NO
202	Lead	>MEAN + 2SD,MAX	<mean,max< td=""><td>No Trend</td><td>1Population</td><td></td><td>NO</td></mean,max<>	No Trend	1Population		NO
200	Lithium	<mean,max< td=""><td>>MEAN,MAX</td><td>No Trend</td><td>Not Eval.</td><td></td><td>NO</td></mean,max<>	>MEAN,MAX	No Trend	Not Eval.		NO
201	Lithium	<mean,max< td=""><td>>MEAN,MAX</td><td>No Trend</td><td>Not Eval.</td><td></td><td>NO</td></mean,max<>	>MEAN,MAX	No Trend	Not Eval.		NO
202	Lithium	<mean,max< td=""><td>>MEAN,MAX</td><td>No Trend</td><td>Not Eval.</td><td></td><td>NO</td></mean,max<>	>MEAN,MAX	No Trend	Not Eval.		NO
200	Magnesium	<mean,max< td=""><td><mean,max< td=""><td>No Trend</td><td>Not Eval.</td><td></td><td>NO</td></mean,max<></td></mean,max<>	<mean,max< td=""><td>No Trend</td><td>Not Eval.</td><td></td><td>NO</td></mean,max<>	No Trend	Not Eval.		NO
201	Magnesium	<mean +="" 2sd,max<="" td=""><td><mean,max< td=""><td>No Trend</td><td>Not Eval.</td><td></td><td>NO</td></mean,max<></td></mean>	<mean,max< td=""><td>No Trend</td><td>Not Eval.</td><td></td><td>NO</td></mean,max<>	No Trend	Not Eval.		NO
202	Magnesium	<mean +="" 2sd,max<="" td=""><td><mean,max< td=""><td>No Trend</td><td>Not Eval.</td><td></td><td>NO</td></mean,max<></td></mean>	<mean,max< td=""><td>No Trend</td><td>Not Eval.</td><td></td><td>NO</td></mean,max<>	No Trend	Not Eval.		NO
200	Manganese	<mean,max< td=""><td><mean,max< td=""><td>No Trend</td><td>1 Population</td><td></td><td>NO</td></mean,max<></td></mean,max<>	<mean,max< td=""><td>No Trend</td><td>1 Population</td><td></td><td>NO</td></mean,max<>	No Trend	1 Population		NO
201	Manganese	<mean +="" 2sd,<max<="" td=""><td><mean,>MAX</mean,></td><td>No Trend</td><td>1 Population</td><td></td><td>NO</td></mean>	<mean,>MAX</mean,>	No Trend	1 Population		NO
202	Manganese	<mean,max< td=""><td><mean,max< td=""><td>No Trend</td><td>1 Population</td><td></td><td>NO</td></mean,max<></td></mean,max<>	<mean,max< td=""><td>No Trend</td><td>1 Population</td><td></td><td>NO</td></mean,max<>	No Trend	1 Population		NO
200	Mercury	ND	ND	ND .	Not Eval.		NO
201	Mercury	<mean,max< td=""><td><mean,max< td=""><td>No Trend</td><td>Not Eval.</td><td></td><td>NO</td></mean,max<></td></mean,max<>	<mean,max< td=""><td>No Trend</td><td>Not Eval.</td><td></td><td>NO</td></mean,max<>	No Trend	Not Eval.		NO
202	Mercury	<mean,max< td=""><td><mean,max< td=""><td>No Trend</td><td>Not Eval.</td><td></td><td>NO</td></mean,max<></td></mean,max<>	<mean,max< td=""><td>No Trend</td><td>Not Eval.</td><td></td><td>NO</td></mean,max<>	No Trend	Not Eval.		NO
200	Molybdenum	<mean,max< td=""><td><mean,max< td=""><td>No Trend</td><td>Not Eval.</td><td></td><td>NO</td></mean,max<></td></mean,max<>	<mean,max< td=""><td>No Trend</td><td>Not Eval.</td><td></td><td>NO</td></mean,max<>	No Trend	Not Eval.		NO
201 202	Molybdenum Molybdenum	<mean,max< td=""><td><mean,max< td=""><td>No Trend</td><td>Not Eval.</td><td></td><td>NO</td></mean,max<></td></mean,max<>	<mean,max< td=""><td>No Trend</td><td>Not Eval.</td><td></td><td>NO</td></mean,max<>	No Trend	Not Eval.		NO
202	Nickel	<mean,max< td=""><td><mean,max< td=""><td>No Trend No Trend</td><td>Not Eval.</td><td></td><td>NO NO</td></mean,max<></td></mean,max<>	<mean,max< td=""><td>No Trend No Trend</td><td>Not Eval.</td><td></td><td>NO NO</td></mean,max<>	No Trend No Trend	Not Eval.		NO NO
200	Nickel	<mean,max <mean,>MAX</mean,></mean,max 	<mean,max< td=""><td>No Trend</td><td>Not Eval. Not Eval.</td><td></td><td>NO</td></mean,max<>	No Trend	Not Eval. Not Eval.		NO
202	Nickel	<mean,>MAX</mean,>	<mean,>MAX <mean,max< td=""><td>No Trend</td><td>Not Eval.</td><td></td><td>NO</td></mean,max<></mean,>	No Trend	Not Eval.		NO
200	^{239/240} Pu	<mean,max< td=""><td>· · · · · · · · · · · · · · · · · · ·</td><td></td><td></td><td></td><td>NO</td></mean,max<>	· · · · · · · · · · · · · · · · · · ·				NO
	239/240 _{P11}	•	<mean,max< td=""><td>No Trend</td><td>Not Eval.</td><td></td><td></td></mean,max<>	No Trend	Not Eval.		
201	^{239/240} Pu	<mean,max< td=""><td><mean,max< td=""><td>No Trend</td><td>Not Eval.</td><td></td><td>NO</td></mean,max<></td></mean,max<>	<mean,max< td=""><td>No Trend</td><td>Not Eval.</td><td></td><td>NO</td></mean,max<>	No Trend	Not Eval.		NO
202		<mean +="" 2sd,max<="" td=""><td><mean,max< td=""><td>No Trend</td><td>Not Eval.</td><td></td><td>NO</td></mean,max<></td></mean>	<mean,max< td=""><td>No Trend</td><td>Not Eval.</td><td></td><td>NO</td></mean,max<>	No Trend	Not Eval.		NO
200	Potassium	<mean +="" 2sd,max<="" td=""><td><mean,max< td=""><td>No Trend</td><td>Not Eval.</td><td></td><td>NO</td></mean,max<></td></mean>	<mean,max< td=""><td>No Trend</td><td>Not Eval.</td><td></td><td>NO</td></mean,max<>	No Trend	Not Eval.		NO
201	Potassium	<mean +="" 2sd,max<="" td=""><td><mean,max< td=""><td>No Trend</td><td>Not Eval.</td><td></td><td>NO</td></mean,max<></td></mean>	<mean,max< td=""><td>No Trend</td><td>Not Eval.</td><td></td><td>NO</td></mean,max<>	No Trend	Not Eval.		NO
202	Potassium	<mean,max< td=""><td><mean,max< td=""><td>No Trend</td><td>Not Eval.</td><td></td><td>NO</td></mean,max<></td></mean,max<>	<mean,max< td=""><td>No Trend</td><td>Not Eval.</td><td></td><td>NO</td></mean,max<>	No Trend	Not Eval.		NO
200 201	Selenium Selenium	ND	ND	ND	Not Eval.		NO
201	Selenium	<mean +="" 2sd,max<="" td=""><td>~MAX</td><td>No Trend</td><td>Not Eval.</td><td></td><td>NO</td></mean>	~MAX	No Trend	Not Eval.		NO
202		ND MEANAAY	ND	ND	Not Eval.		NO
200	Silicon Silicon	<mean,max< td=""><td>NA NA</td><td>No Trend</td><td>1 Population</td><td></td><td>NO</td></mean,max<>	NA NA	No Trend	1 Population		NO
202	Silicon	<mean.max< td=""><td>NA NA</td><td>No Trend No Trend</td><td>1 Population</td><td></td><td>NO NO</td></mean.max<>	NA NA	No Trend No Trend	1 Population		NO NO
202	Silver	<mean,max ND</mean,max 	NA ND	NO Trend ND	1 Population		NO NO
201	Silver	ND	ND ND	ND	Not Eval.		NO
202	Silver	ND ·		ND ND	Not Eval.		NO
202	Sodium	<mean,max< td=""><td>ND <mean,max< td=""><td>טא No Trend</td><td>Not Eval. Not Eval.</td><td></td><td>NO NO</td></mean,max<></td></mean,max<>	ND <mean,max< td=""><td>טא No Trend</td><td>Not Eval. Not Eval.</td><td></td><td>NO NO</td></mean,max<>	טא No Trend	Not Eval. Not Eval.		NO NO
201	Sodium	>MEAN + 2SD. >MAX	<mean,max< td=""><td>No Trend</td><td>Not Eval.</td><td></td><td>NO</td></mean,max<>	No Trend	Not Eval.		NO
202	Sodium	>IVIEAN + 2SD, >MAX <mean +="" 2sd,="">MAX</mean>		No Trend	Not Eval.		NO
200	Strontium	<mean,max< td=""><td><mean,>MAX <mean,>MAX</mean,></mean,></td><td>No Trend</td><td>Not Eval.</td><td></td><td>NO</td></mean,max<>	<mean,>MAX <mean,>MAX</mean,></mean,>	No Trend	Not Eval.		NO
201	Strontium	<mean,max< td=""><td><mean,max< td=""><td>No Trend</td><td>Not Eval.</td><td></td><td>NO</td></mean,max<></td></mean,max<>	<mean,max< td=""><td>No Trend</td><td>Not Eval.</td><td></td><td>NO</td></mean,max<>	No Trend	Not Eval.		NO
202	Strontium	<mean,max< td=""><td><mean,max< td=""><td>No Trend</td><td>Not Eval.</td><td></td><td>NO</td></mean,max<></td></mean,max<>	<mean,max< td=""><td>No Trend</td><td>Not Eval.</td><td></td><td>NO</td></mean,max<>	No Trend	Not Eval.		NO
LUL	Ca Oriudili		ZIAITULA'IAIVV	NO HENG	HUL EVAL		140

EG&G ROCKY FLATS ENVIRONMENTAL TECHNOLOGY SITE

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TABLE 2-5

WEIGHT-OF-EVIDENCE EVALUATION SUMMARY OU3 SURFACE WATER ROCKY FLATS ENVIRONMENTAL TECHNOLOGY SITE

1	2	3	4	5	6	7	8
			Benchark	Spatial			
IHSS	Chemical	BGCR Evaluation	Evaluation	Analysis	PROBPLOT	Comments	PCOC?
200	Thallium	ND	ND	ND	Not Eval.		NO
201	Thallium	ND	ND	ND	Not Eval.		NO
202	Thallium	ND	ND	ND	Not Eval.		NO
200	Tin	<mean,max< td=""><td>NA</td><td>No Trend</td><td>Not Eval.</td><td></td><td>NO</td></mean,max<>	NA	No Trend	Not Eval.		NO
201	Tin	ND	ND	ND	Not Eval.		NO
202	Tin	<mean,max< td=""><td>NA</td><td>No Trend</td><td>Not Eval.</td><td></td><td>NO</td></mean,max<>	NA	No Trend	Not Eval.		NO
200	Tritium	<mean,max< td=""><td><mean,max< td=""><td>No Trend</td><td>Not Eval.</td><td></td><td>NO</td></mean,max<></td></mean,max<>	<mean,max< td=""><td>No Trend</td><td>Not Eval.</td><td></td><td>NO</td></mean,max<>	No Trend	Not Eval.		NO
200	233/234 _U	<mean +="" 2sd,max<="" td=""><td><mean,max< td=""><td>No Trend</td><td>Not Eval.</td><td></td><td>NO</td></mean,max<></td></mean>	<mean,max< td=""><td>No Trend</td><td>Not Eval.</td><td></td><td>NO</td></mean,max<>	No Trend	Not Eval.		NO
201	^{233/234} U	<mean +="" 2sd,max<="" td=""><td><mean,max< td=""><td>No Trend</td><td>Not Eval.</td><td></td><td>NO</td></mean,max<></td></mean>	<mean,max< td=""><td>No Trend</td><td>Not Eval.</td><td></td><td>NO</td></mean,max<>	No Trend	Not Eval.		NO
202	233/234 _U	<mean,max< td=""><td><mean,max< td=""><td>No Trend</td><td>Not Eval.</td><td></td><td>NO</td></mean,max<></td></mean,max<>	<mean,max< td=""><td>No Trend</td><td>Not Eval.</td><td></td><td>NO</td></mean,max<>	No Trend	Not Eval.		NO
200	²³⁵ U	<mean +="" 2sd,="">MAX</mean>	>MAX	No Trend	Not Eval.		NO
201	²³⁵ U	<mean +="" 2sd,max<="" td=""><td>>MAX</td><td>No Trend</td><td>Not Eval.</td><td></td><td>NO</td></mean>	>MAX	No Trend	Not Eval.		NO
202	²³⁵ U	<mean,max< td=""><td>>MAX</td><td>No Trend</td><td>Not Eval.</td><td></td><td>NO</td></mean,max<>	>MAX	No Trend	Not Eval.		NO
200	²³⁸ U	<mean +="" 2sd,max<="" td=""><td><mean,max< td=""><td>No Trend</td><td>Not Eval.</td><td></td><td>NO</td></mean,max<></td></mean>	<mean,max< td=""><td>No Trend</td><td>Not Eval.</td><td></td><td>NO</td></mean,max<>	No Trend	Not Eval.		NO
201	²³⁸ U	<mean +="" 2sd,max<="" td=""><td><mean,max< td=""><td>No Trend</td><td>Not Eval.</td><td></td><td>NO</td></mean,max<></td></mean>	<mean,max< td=""><td>No Trend</td><td>Not Eval.</td><td></td><td>NO</td></mean,max<>	No Trend	Not Eval.		NO
202	²³⁸ U	<mean,max< td=""><td><mean,max< td=""><td>No Trend</td><td>Not Eval.</td><td></td><td>NO</td></mean,max<></td></mean,max<>	<mean,max< td=""><td>No Trend</td><td>Not Eval.</td><td></td><td>NO</td></mean,max<>	No Trend	Not Eval.		NO
200	Vanadium	<mean,max< td=""><td>NA</td><td>No Trend</td><td>Not Eval.</td><td></td><td>NO</td></mean,max<>	NA	No Trend	Not Eval.		NO
201	Vanadium	<mean,max< td=""><td>NA</td><td>No Trend</td><td>Not Eval.</td><td></td><td>NO</td></mean,max<>	NA	No Trend	Not Eval.		NO
202	Vanadium	<mean,max< td=""><td>NA</td><td>No Trend</td><td>Not Eval.</td><td></td><td>NO</td></mean,max<>	NA	No Trend	Not Eval.		NO
200	Zinc	<mean +="" 2sd,="" <max<="" td=""><td>>MEAN,MAX</td><td>No Trend</td><td>Not Eval.</td><td></td><td>NO</td></mean>	>MEAN,MAX	No Trend	Not Eval.		NO
201	Zinc	<mean +="" 2sd,="" <max<="" td=""><td>>MEAN,MAX</td><td>No Trend</td><td>Not Eval.</td><td></td><td>NO</td></mean>	>MEAN,MAX	No Trend	Not Eval.		NO
202	Zinc	<mean +="" 2sd,="" <max<="" td=""><td><mean,max< td=""><td>No Trend</td><td>Not Eval.</td><td></td><td>NO</td></mean,max<></td></mean>	<mean,max< td=""><td>No Trend</td><td>Not Eval.</td><td></td><td>NO</td></mean,max<>	No Trend	Not Eval.		NO

Notes:

IHSS - Individual Hazardous Substance Site.

ND = Not detected.

NA = No literature data available.

- <MEAN = OU 3 mean value is less than background or benchmark mean value.</p>
- >MEAN = OU 3 mean value is greater than background or benchmark mean value.
- <MEAN, MAX = OU 3 mean and maximum values are less than background or benchmark mean and maximum values.</p>
- >MEAN, MAX = OU 3 mean and maximum values are greater than background or benchmark mean and maximum values. MAX = maximum value.
- MEAN + 2SD = upper-bound background mean (i.e., mean plus two standard deviations).
- Column 3: Comparison of OU 3 stream to Background Geochemical Charact. Report stream data.
- Column 4: Comparison of OU 3 reservoir to benchmark lake data.
- Column 5: No Trend = spatial analyses indicates no contamination from RFP. Spatial distribution is

consistent with physical properties associated with natural deposition.

- Column 6: PROBPLOT results. PROBPLOT is used to assess the number of populations within data set.
- Column 7: Discussion of weight-of-evidence evaluation results.
- Column 8: No = chemical not identified as a potential chemical of concern.

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- The mean and maximum values for strontium in OU 3 groundwater exceed corresponding mean and maximum values for BGCR groundwater samples.
- The maximum value for strontium in OU 3 groundwater exceeds the maximum benchmark value.

Table 2-6 summarizes the results of the weight-of-evidence evaluations for all groundwater analytes. In general, most OU 3 values are less than corresponding background and benchmark values. Columns 3 and 4 in Table 2-6 show comparisons of OU 3 data to BGCR groundwater data (upper and lower flow systems) and benchmark data, respectively; mean and maximum values for the corresponding OU 3 and background/benchmark data sets were compared. Columns 5 and 6 report summary comments and whether the chemical is carried through the CDPHE Conservative Screen (i.e., is identified as a PCOC), respectively.

The comparisons of OU 3 groundwater data (IHSS 200) to background and benchmark data indicate that mean and maximum concentrations of potassium in IHSS 200 exceed corresponding BGCR data, and the maximum concentration exceeds the literature benchmark value. Although OU 3 values exceed background and benchmark values, potassium was not retained as a PCOC for the remaining steps of the CDPHE Conservative Screen because potassium is considered to be an essential human nutrient and is not evaluated for risk (EPA, 1989a). TM 4 includes a discussion of the elimination of five essential nutrients as COCs.

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TABLE 2-6

WEIGHT-OF-EVIDENCE EVALUATION SUMMARY OU 3 GROUNDWATER

ROCKY FLATS ENVIRONMENTAL TECHNOLOGY SITE

IHSS	Chemical	Background Geo. Char. (49192/Upper, 49292/Lower)	Benchmark Evaluation	COMMENTS	PCOC?
200	ALUMINUM	<mean +="" 2sd,="">MAX</mean>	>MAX	3 ROUNDS ELEVATED DUE TO HIGH TSS	NO
201	ALUMINUM	<mean,max< td=""><td><max< td=""><td></td><td>NO</td></max<></td></mean,max<>	<max< td=""><td></td><td>NO</td></max<>		NO
200	²⁴¹ AM	<mean,max< td=""><td>NA</td><td></td><td>NO</td></mean,max<>	NA		NO
201	²⁴¹ AM	<mean,max< td=""><td>NA.</td><td></td><td>NO</td></mean,max<>	NA.		NO
200	ANTIMONY	<mean,max< td=""><td>NA NA</td><td></td><td>NO</td></mean,max<>	NA NA		NO
201	ANTIMONY	ND	ND		NO
200	ARSENIC	<mean +="" 2sd.="">MAX</mean>	<max< td=""><td></td><td>NO</td></max<>		NO
201	ARSENIC	<mean.max< td=""><td><max< td=""><td></td><td>NO</td></max<></td></mean.max<>	<max< td=""><td></td><td>NO</td></max<>		NO
200	BARIUM	<mean,max< td=""><td><max< td=""><td></td><td>NO</td></max<></td></mean,max<>	<max< td=""><td></td><td>NO</td></max<>		NO
201	BARIUM	<mean.max< td=""><td><max< td=""><td></td><td>NO</td></max<></td></mean.max<>	<max< td=""><td></td><td>NO</td></max<>		NO
200	BERYLLIUM	<mean.max< td=""><td><max< td=""><td></td><td>NO</td></max<></td></mean.max<>	<max< td=""><td></td><td>NO</td></max<>		NO
201	BERYLLIUM	ND	ND		NO
200	CADMIUM	<mean +="" 2sd.<max<="" td=""><td>>MAX</td><td>MEANS SIMILAR, 1 DETECT</td><td>NO</td></mean>	>MAX	MEANS SIMILAR, 1 DETECT	NO
201	CADMIUM	ND	ND	, , , , , , , , , , , , , , , , , , , ,	NO
200	CALCIUM	>MEAN + 2SD.MAX	<max< td=""><td>WATER TYPING</td><td>NO</td></max<>	WATER TYPING	NO
201	CALCIUM	>MEAN + 2SD.MAX	<max< td=""><td>WATER TYPING</td><td>NO</td></max<>	WATER TYPING	NO
200	CESIUM	<mean,max< td=""><td></td><td></td><td>NO</td></mean,max<>			NO
201	CESIUM	ND			NO
200	CHROMIUM	<mean +="" 2sd.<max<="" td=""><td>>MAX</td><td>3 ROUNDS ELEVATED DUE TO HIGH TSS</td><td>NO</td></mean>	>MAX	3 ROUNDS ELEVATED DUE TO HIGH TSS	NO
201	CHROMIUM	<mean,max< td=""><td><max< td=""><td></td><td>NO</td></max<></td></mean,max<>	<max< td=""><td></td><td>NO</td></max<>		NO
200	COBALT	<mean,max< td=""><td>>MAX</td><td></td><td>NO</td></mean,max<>	>MAX		NO
201	COBALT	ND	ND		NO
200	COPPER	<mean +="" 2sd,<max<="" td=""><td>>MAX</td><td>3 ROUNDS ELEVATED DUE TO HIGH TSS</td><td>NO</td></mean>	>MAX	3 ROUNDS ELEVATED DUE TO HIGH TSS	NO
201	COPPER	<mean,max< td=""><td><max< td=""><td></td><td>NO</td></max<></td></mean,max<>	<max< td=""><td></td><td>NO</td></max<>		NO
200	IRON	<mean +="" 2sd,max<="" td=""><td>>MAX</td><td>3 ROUNDS ELEVATED DUE TI HIGH TSS</td><td>NO</td></mean>	>MAX	3 ROUNDS ELEVATED DUE TI HIGH TSS	NO
201	IRON	<mean,max< td=""><td><max< td=""><td></td><td>NO</td></max<></td></mean,max<>	<max< td=""><td></td><td>NO</td></max<>		NO
200	LEAD	<mean +="" 2sd,<max<="" td=""><td>>MAX</td><td>3 ROUNDS ELEVATED DUE TO HIGH TSS</td><td>NO</td></mean>	>MAX	3 ROUNDS ELEVATED DUE TO HIGH TSS	NO
201	LEAD	<mean,max< td=""><td><max< td=""><td></td><td>NO</td></max<></td></mean,max<>	<max< td=""><td></td><td>NO</td></max<>		NO
200	LITHIUM	>MEAN + 2SD,MAX	<max< td=""><td>LITERATURE VALUE FROM MATHESS 1989</td><td>NO</td></max<>	LITERATURE VALUE FROM MATHESS 1989	NO
201	LITHIUM	<mean +="" 2sd,max<="" td=""><td><max< td=""><td>LITERATURE VALUE FROM MATHESS 1989</td><td>NO</td></max<></td></mean>	<max< td=""><td>LITERATURE VALUE FROM MATHESS 1989</td><td>NO</td></max<>	LITERATURE VALUE FROM MATHESS 1989	NO
200	MAGNESIUM	>MEAN + 2SD,MAX	<max< td=""><td>WATER TYPING</td><td>NO</td></max<>	WATER TYPING	NO
201	MAGNESIUM	>MEAN + 2SD.MAX	<max< td=""><td>WATER TYPING</td><td>NO</td></max<>	WATER TYPING	NO
200	MANGANESE	>MEAN + 2SD.MAX	<max< td=""><td></td><td>NO</td></max<>		NO
201	MANGANESE	<mean,max< td=""><td><max< td=""><td></td><td>NO</td></max<></td></mean,max<>	<max< td=""><td></td><td>NO</td></max<>		NO
200	MERCURY	ND	ND		NO
201	MERCURY	ND	ND		NO
200	MOLYBDENUM	ND	ND		NO
201	MOLYBDENUM	<mean,max< td=""><td><max< td=""><td></td><td>NO</td></max<></td></mean,max<>	<max< td=""><td></td><td>NO</td></max<>		NO
200	NICKEL	<mean +="" 2sd.max<="" td=""><td><max< td=""><td></td><td>NO</td></max<></td></mean>	<max< td=""><td></td><td>NO</td></max<>		NO
201	NICKEL	ND	ND		NO
200	^{239/240} PU	<mean +="" 2sd,max<="" td=""><td>NA</td><td></td><td>NO</td></mean>	NA		NO
201	^{239/240} PU	<mean +="" 2sd,max<="" td=""><td>NA</td><td></td><td>NO</td></mean>	NA		NO
200	POTASSIUM	>MEAN + 2SD,>MAX	>MAX	WATER TYPING; ESSENTIAL NUTRIENT; CONCENTRATION CORRESPONDS TO A SAFE DOSE	NO
201	POTASSIUM	<mean +="" 2sd.max<="" td=""><td><max< td=""><td>WATER TYPING</td><td>NO</td></max<></td></mean>	<max< td=""><td>WATER TYPING</td><td>NO</td></max<>	WATER TYPING	NO
200	SELENIUM	<mean,max< td=""><td><max< td=""><td></td><td>NO</td></max<></td></mean,max<>	<max< td=""><td></td><td>NO</td></max<>		NO
201	SELENIUM	ND	ND		NO
200	SILICON	<mean +="" 2sd.="">MAX</mean>	<max< td=""><td>OU 3 MAXIMUM SLIGHTLY GREATER</td><td>NO</td></max<>	OU 3 MAXIMUM SLIGHTLY GREATER	NO
201	SILICON	<mean,max< td=""><td><max< td=""><td></td><td>NO</td></max<></td></mean,max<>	<max< td=""><td></td><td>NO</td></max<>		NO

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TABLE 2-6

WEIGHT-OF-EVIDENCE EVALUATION SUMMARY **OU 3 GROUNDWATER**

ROCKY FLATS ENVIRONMENTAL TECHNOLOGY SITE

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		Background Geo. Char. (49192/Upper,	Benchmark		
IHSS	Chemical	49292/Lower)	Evaluation	COMMENTS	PCOC?
200	SILVER	ND	ND		NO
201	SILVER	ND	ND		NO
200	SODIUM	>MEAN + 2SD.MAX	<max< td=""><td>WATER TYPING</td><td>NO</td></max<>	WATER TYPING	NO
201	SODIUM	<mean +="" 2sd,max<="" td=""><td><max< td=""><td>WATER TYPING</td><td>NO</td></max<></td></mean>	<max< td=""><td>WATER TYPING</td><td>NO</td></max<>	WATER TYPING	NO
200	STRONTIUM	>MEAN + 2SD,MAX	>MAX		YES
201	STRONTIUM	>MEAN + 2SD,MAX	<max< td=""><td></td><td>NO</td></max<>		NO
200	THALLIUM	ND	ND		NO
201	THALLIUM	ND	ND		NO
200	TIN	<mean,max< td=""><td><max< td=""><td></td><td>NO</td></max<></td></mean,max<>	<max< td=""><td></td><td>NO</td></max<>		NO
201	TIN	ND	ND		NO
200	^{233/234} U	<mean,max< td=""><td>NA</td><td></td><td>NO</td></mean,max<>	NA		NO
201	233/234 <u>U</u>	<mean,max< td=""><td>NA</td><td>A commence of the commence of</td><td>NO</td></mean,max<>	NA	A commence of the commence of	NO
200	²³⁵ U	<mean.max< td=""><td>NA</td><td></td><td>NO</td></mean.max<>	NA		NO
201	²³⁵ U	<mean +="" 2sd,="">MAX</mean>	NA	MEAN < UPPER BACKGROUND MEAN, MAX	NO
200	²³⁸ U	<mean,max< td=""><td>NA</td><td></td><td>NO.</td></mean,max<>	NA		NO.
201	²³⁸ U	<mean +="" 2sd,="">MAX</mean>	NA	MEAN < UPPER BACKGROUND MEAN,MAX	NO
200	VANADIUM	<mean +="" 2sd,max<="" td=""><td>>MAX</td><td>3 ROUNDS ELEVATED DUE TO HIGH TSS</td><td>NO</td></mean>	>MAX	3 ROUNDS ELEVATED DUE TO HIGH TSS	NO
201	VANADIUM	ND	ND		NO
200	ZINC	<mean +="" 2sd.max<="" td=""><td><max< td=""><td>3 ROUNDS ELEVATED DUE TO HIGH TSS</td><td>NO</td></max<></td></mean>	<max< td=""><td>3 ROUNDS ELEVATED DUE TO HIGH TSS</td><td>NO</td></max<>	3 ROUNDS ELEVATED DUE TO HIGH TSS	NO
201	ZINC	<mean,max< td=""><td><max< td=""><td></td><td>NO</td></max<></td></mean,max<>	<max< td=""><td></td><td>NO</td></max<>		NO

IHSS = Individual Hazardous Substance Site.

- < MEAN = OU 3 mean value is less than background or benchmark mean value.
- > MEAN = OU 3 mean value is greater than background or benchmark mean value.
- <MAX = OU 3 Maximum value is less than background or benchmark maximum value.
- >MAX = OU 3 Maximum value is greater than background or benchmark maximum value.
- <MEAN, MAX = OU 3 mean and maximum values are less than background or benchmark mean and maximum values.
- >MEAN, MAX = OU 3 mean and maximum values are greater than background or benchmark mean and maximum values.

MAX = maximum value.

MEAN + 2SD = Upper bound background mean (i.e., mean plus two standard deviations).

TSS = Total suspended solids.

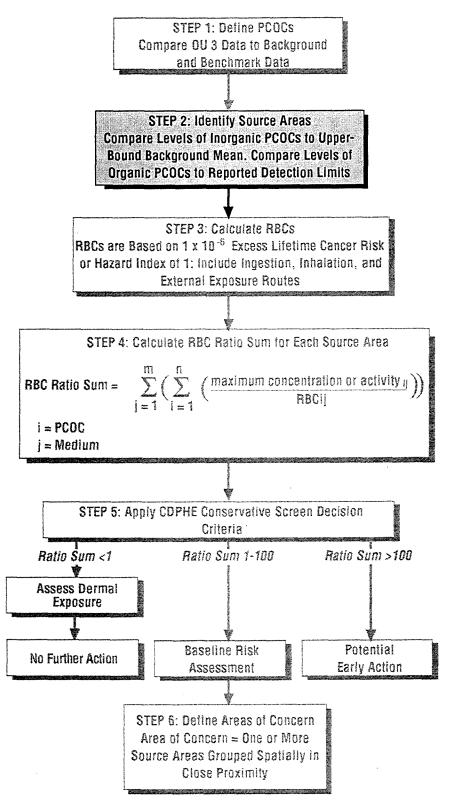
Column 3: Comparison of OU 3 groundwater data to Background Geochemical Characterization Report. IHSS 200 compared to upper flow regime and IHSS 201 compared to lower flow regime

Column 4: Comparison of OU 3 groundwater data to benchmark lake data.

Column 5: Discussion of weight-of-evidence results.

Column 6: YES = chemical was identified as a potential chemical of concern (PCOC). NO = not a PCOC.

Section 3.0 STEP 2: SOURCE AREA IDENTIFICATION



CDPHE = Colorado Department of Public Health and Environment

PCOC = Potential Chemical of Concern

RBC = Risk-Based Concentration

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3.0 STEP 2: SOURCE AREA IDENTIFICATION

The purpose of Step 2 of the CDPHE Conservative Screen is to delineate areas of each IHSS within the OU where concentrations or activities of each PCOC exceed an upper-bound background value (i.e., background mean plus two standard deviations); these areas are then designated as "Source Areas." The Source Areas identified by this step can represent potential contamination associated with primary sources located within the OU, or as is the case for OU 3, secondary sources resulting from deposition of chemicals that have migrated from primary sources outside of OU 3.

As discussed in Section 2.0, surface soil is the only OU 3 medium that has a background data set suitable for rigorous statistical comparisons. Therefore, this step of the CDPHE Conservative Screen Process was performed only for IHSS 199. For Great Western Reservoir, the entire IHSS was considered as a Source Area for subsequent steps in the CDPHE Conservative Screen because the IHSS is a spatially discrete water body, including individual drainages associated with the reservoir (Figure 3-1 shows the location of Great Western Reservoir [IHSS 200]. Because no PCOCs were identified for IHSSs 201 or 202, those IHSSs were not evaluated further in the CDPHE Conservative Screen for OU 3.

For this step, ²⁴¹Am and ^{239/240}Pu activities at each surface-soil sampling location, including RFI/RI and Jefferson County Remedy Acres sampling plots, were compared to their respective upper-bound background values (i.e., 0.04 picocuries per gram [pCi/g] for ²⁴¹Am and 0.09 pCi/g for ^{239/240}Pu). Nineteen out of 61 RFI/RI sample locations (Figure 3-1) and all 47 Jefferson County Remedy Acres locations (Figure 3-2) have either ²⁴¹Am or ^{239/240}Pu activities that exceed the upper-bound background values and, therefore, were identified as Source Areas for OU 3. Figures 3-1 and 3-2 also show all RFI/RI and Jefferson County Remedy Acres locations, respecactively. (Figure 3-2 shows two locations for T8 which is a composited sample.) The left half of the symbols on the figures show the results of the comparison of the ²⁴¹Am activity at each location to the upper-bound ²⁴¹Am background value. The right half of the symbols show the results of the comparison of the ^{239/240}Pu

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background value. Blue symbols indicate a sample location with an activity greater than the upper-bound background value. Green symbols represent sample locations that do not exceed upper-bound background values; 42 of the 61 RFI/RI locations have ²⁴¹Am and ^{239/240}Pu activities that do not exceed upper-bound background values. Table 3-1 summarizes ²⁴¹Am and ^{239/240}Pu activities for each surface-soil sampling location.

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TABLE 3-1

AMERICIUM²⁴¹ AND PLUTONIUM^{239/240} ACTIVITIES FOR OU3 SURFACE-SOIL LOCATIONS ROCKY FLATS ENVIRONMENTAL TECHNOLOGY SITE

Location Code	Americium ²⁴¹ (pCi/g)	Plutonium ^{239/240} (pCi/g)
PT12592	0.012	0.029
PT12692	0.012	0.023
PT12792	0.029	0.132
PT12892	0.030	0.036
PT12992	R	0.020
PT13092	0.021	0.047
PT13192	0.028	0.069
PT13292	0.008	0.017
PT13392	0.011	0.041
PT13492	0.003	0.030
PT13592	0.062	0.205
PT13792	0.011	0.034
PT14092	0.010	0.021
PT14192	0.520	2.950
PT14292	0.013	0.280
PT14392	0.020	0.270
PT14492	0.033	0.015
PT14592	0.030	0.068
PT14692	0.013	0.035
PT14792	0.006	0.013
PT14892	0.001	0.008
. PT14992	0.023	0.095
PT15092	0.036	0.160
PT15192	0.081	0.745
PT15292	0.095	0.511
PT15392	0.034	0.215
PT15492	0.026	0.055
PT15592	0.013	0.041
PT15692	0.019	0.036
PT15792	-0.002	0.012
PT15892	0.004	0.042
PT15992	0.006	0.282
PT16092	0.004	0.041
PT16192	0.016	0.052
PT16292	0.068	0.089
PT16392	0.054	0.115
PT16492	0.008	0.024
PT16592	0.013	0.034
PT16692	0.027	0,040
PT16792	0.001	0.020
PT16992	0.003	0.028
PT17092	0.011	0.031
PT17192	0.026	0.016
PT17292	R	0.085
PT17392	0.005	0.034
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TABLE 3-1

AMERICIUM²⁴¹ AND PLUTONIUM^{239/240} ACTIVITIES FOR OU3 SURFACE-SOIL LOCATIONS ROCKY FLATS ENVIRONMENTAL TECHNOLOGY SITE

Location Code	Americium ²⁴¹ (pCi/g)	Plutonium ^{239/240} (pCi/g)
PT17492	0.002	0.017
PT17692	0.004	0.012
PT17792	0.008	0.074
PT17992	0.014	0.059
PT18592	0.099	0.665
PT18692	0.036	0.735
PT18792	0.011	0.051
PT18892	0.013	0.021
PT18992	R	0.019
PT19092	0.009	0.032
PT19192	0.038	0.148
PT19292	0.166	0.321
PT19392	. R	0.014
PT19492	0.077	0.087
PT19592	0.052	0.250
PT19692	0.006	0.009
T1A	R	0.952
T1B	R	1.475
T2A	R	0.757
T2B	R	0.681
T2C	R	1.600
. T3A	R	0.923
ТЗВ	R	0.734
T3C	R	0.656
T4A	0.161	0.808
T4B	0.078	0.365
T5	0.128	0.566
T6	0.060	0.476
T7	0.056	0.162
., Т8	0.041	0.225
T9	0.114	0.592
T10	0.053	0.249
T11	0.065	0.480
T12A	0.049	0.288
T12B	0.048	0.356
	0.200	0.891
T13A		0.686
T13B	0.095	
T14A	0.100	0.608
T14B	0.088	0.432
T15A	0.213	1.336
T15B	0.140	1.084
U1A	R	6.468
U1B	R	2.672
U2A	R	3.590
U2B	R	1.219
U3A	0.279	1.696
U3B	0.260	1.190

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TABLE 3-1

. AMERICIUM²⁴¹ AND PLUTONIUM^{239/240} ACTIVITIES FOR OU3 SURFACE-SOIL LOCATIONS ROCKY FLATS ENVIRONMENTAL TECHNOLOGY SITE

Location Code	Americium ²⁴¹ (pCi/g)	Plutonium ^{239/240} (pCi/g)
U4	0.099	0.178
U5	0.118	0.412
U6	0.101	0.423
U7	0.268	1.151
U8	0.150	0.201
U9	0.306	1.857
U10A	0.363	1.739
U10B	0.229	1.089
U11A	0.112	0.718
U11B	0.141	0.771
U12A	0.195	0.972
U12B	0.122	0.742
U13A	0.197	1.272
U13B	0.159	0.762
U14A	0.138	0.683
U14B	0.161	0.989

Notes:

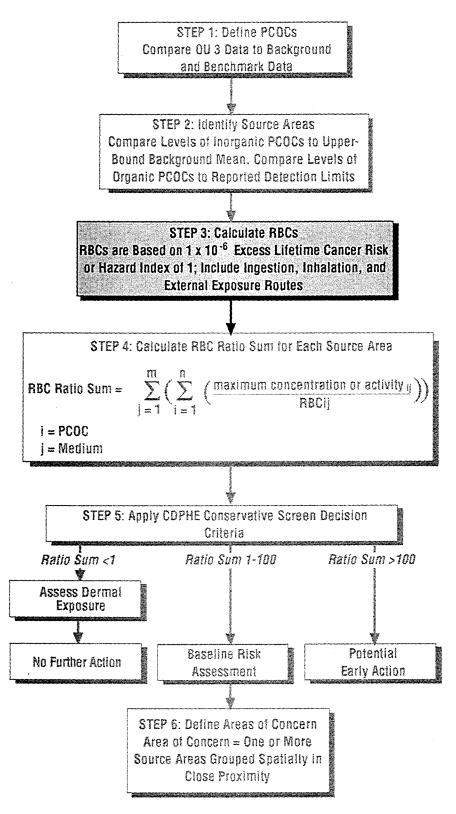
pCi/g = picocuries per gram.

R = Analytical result was rejected by data validators.

T = tilled.

U = untilled.

Section 4.0 STEP 3: RISK-BASED CONCENTRATION CALCULATIONS



CDPHE = Colorado Department of Public Health and Environment

PCOC = Potential Chemical of Concern

RBC = Risk-Based Concentration

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4.0 STEP 3: RISK-BASED CONCENTRATION CALCULATIONS

The RBCs presented in the <u>Final Rocky Flats Programmatic Risk-Based Preliminary Remediation Goals</u> (DOE, 1994c) were used for Step 3 of the CDPHE Conservative Screen for OU 3. The purpose of the Programmatic Preliminary Remediation Goals (PRGs) document was to develop initial sitewide cleanup levels (chemical- and medium-specific) for RFETS that are protective of human health and the environment (DOE, 1994c). The PRGs also were developed to be used as RBCs in the data aggregation process for HHRAs.

The RBCs used in the CDPHE Conservative Screen for OU 3 are based on a residential scenario for soil, sediment, and groundwater. A target risk of 1 × 10⁻⁶ was used for carcinogenic chemicals and a target Hazard Index of 1 was used for noncarcinogenic chemicals to calculate the RBCs. The RBCs are based on exposure via the ingestion, inhalation, and external exposure (radionuclides only) pathways. Table 4-1 summarizes the RBCs for each PCOC in surface soil, surface sediment, subsurface sediment, and groundwater. RBCs were not calculated for surface water since no surface water PCOCs were identified.

EG&G ROCKY FLATS ENVIRONMENTAL TECHNOLOGY SITE

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TABLE 4-1

RISK-BASED CONCENTRATIONS FOR OU 3 PCOCs ROCKY FLATS ENVIRONMENTAL TECHNOLOGY SITE

Medium	IHSS	PCOCs	Risk Based Concentrations
Surface Soil	199	²⁴¹ Am	2.37 pCi/g
		^{239/240} Pu	3.43 pCi/g (assumes ²³⁹ Pu)
Surface Sediment (Grab Samples)	200	^{239/240} Pu	3.43 pCi/g (assumes ²³⁹ Pu)
, , ,	201	None	•
	202	None	
Subsurface Sediment (Core Samples)	200	Copper	11,000 mg/kg
, , ,		239/240Pu	3.43 pCi/g (assumes ²³⁹ Pu)
Surface Water	200	None	NA
	202	None	NA
Groundwater	200	Strontium	21.9 mg/L
	201	None	NA .

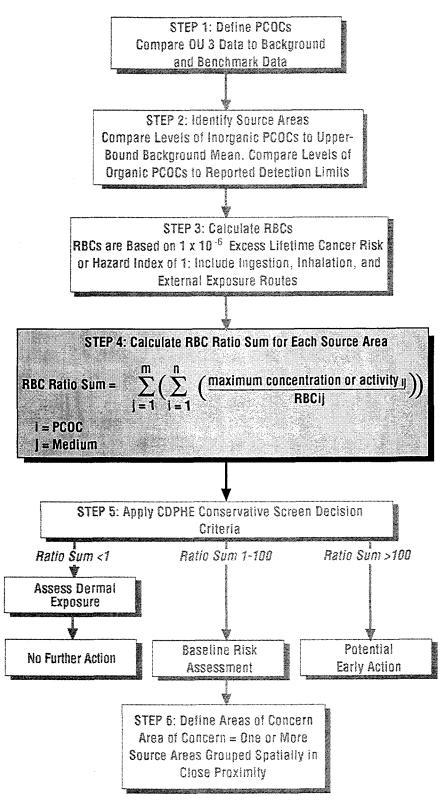
Notes: ·

PCOCs = Inorganic chemicals with detected levels above background levels or organic chemicals detected above detection limits.

NA = Not applicable.

PCOC = Potential Chemical of Concern.

Section 5.0
STEP 4: RATIO OF MAXIMUM CONCENTRATIONS
TO RISK-BASED CONCENTRATIONS



CDPHE = Colorado Department of Public Health and Environment

PCOC = Potential Chemical of Concern

RBC = Risk-Based Concentration

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5.0 STEP 4: RATIO OF MAXIMUM CONCENTRATIONS TO RISK-BASED CONCENTRATIONS

For Step 4 of the CDPHE Conservative Screen, the following ratio was calculated for each PCOC per medium in each Source Area identified in Step 2:

$$RBC$$
 Ratio = $\frac{Maximum\ detected\ concentration\ or\ activity\ of\ PCOC}{RBC\ for\ PCOC}$

The PCOC-specific ratios were then summed for each medium within a Source Area. Carcinogenic-PCOC ratios and noncarcinogenic-PCOC ratios were summed separately because exposures to these two types of PCOCs result in different adverse health effects. Finally, the medium-specific ratios were summed for each Source Area to produce RBC Ratio Sums (i.e., RBC Ratio Sum-C = RBC Ratio Sum for carcinogenic PCOCs; RBC Ratio Sum-NC = RBC Ratio Sum for noncarcinogenic PCOCs) for the Source Areas according to the following formula:

RBC Ratio Sum =
$$\sum_{j=1}^{m} \left(\sum_{i=1}^{n} \left(\text{maximum concentration or activity}_{i,j} / RBC_{i,j} \right) \right)$$

where

RBC = risk-based concentration

i = medium

i = PCOC

maximum concentration or activity = maximum concentration or activity in the Source Area

Three of the surface-soil Source Areas identified in Step 2 have RBC Ratio Sums greater than 1 (sample locations: PT14192, U1A, and U2A). The RBC Ratio Sums for these areas range from

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1 to 2. Figure 5-1 shows RBC Ratio Sums for all RFI/RI surface-soil sampling locations. Blue symbols indicate that a surface-soil location has a RBC Ratio Sum greater than 1. Green symbols indicate surface-soil locations with Ratio Sums less than 1; 18 of the 19 RFI/RI surface soil Source Areas have RBC Ratio Sums less than 1. Figure 5-2 shows Ratio Sums for the Jefferson County Remedy Acres surface-soil locations. Forty-five of the 47 Jefferson County Remedy Acres Source Areas have RBC Ratio Sums less than 1. Table 5-1 summarizes the RBC Ratio Sums for the 20 RFI/RI and 47 Jefferson County Remedy Acres surface-soil Source Areas. Table D-1 in Appendix D shows PCOC-specific ratios, RBCs, and toxicity values for all surface-soil Source Areas.

RBC Ratio Sums for Great Western Reservoir (IHSS 200) were calculated using maximum values of PCOCs from all sediment data (surface and subsurface samples). The RBC Ratio Sum-C for Great Western Reservoir is greater than 1 and the RBC Ratio Sum-NC is less than 1.

Table 5-2 summarizes the Ratio Sums for Great Western Reservoir (IHSS 200). Table D-2 in Appendix D shows PCOC-specific RBC ratios and toxicity values for IHSS 200. PCOC-specific RBC ratios or RBC Ratio Sums were not calculated for IHSSs 201 or 202 because no PCOCs were identified for those IHSSs.

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EG&G ROCKY FLATS ENVIRONMENTAL TECHNOLOGY SIT	Ε
CDPHE Conservative Screen	

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TABLE 5-1

RBC RATIO SUMS FOR OU 3 SURFACE SOIL SOURCE AREAS ROCKY FLATS ENVIRONMENTAL TECHNOLOGY SITE

Location Code	Ratio Sum	Location Code	Ratio Sum
PT12792	0.05	T2C	0.5
PT13592	0.09	T3A	0.3
PT14192	1	ТЗВ	0.2
PT14292	0.1	T3C	0.2
PT14392	0.1	T4A	0.3
PT14992	0.04	T4B	0.1
PT15092	0.06	T5	0.2
PT15192	0.3	T6	0.2
PT15292	0.2	T7	0.07
PT15392	0.08	Т8	80.0
PT15992	0.08	Т9	0.2
PT16292	0.05	U10A	0.7
PT16392	0.06	U10B	0.4
PT18592	0.2	U11A	0.3
PT18692	0.2	U11B	0.3
PT19192	0.06	U12A	0.4
PT19292	0.2	U12B	0.3
PT19492	0.06	U13A	0.5
PT19592	0.09	U13B	0.3
T10	0.1	U14A	0.3
T11	0.2	U14B	0.4
T12A	0.1	U1A	2
T12B	0.1	U1B	0.8
T13A	0.3	U2A	1
T13B	0.2	U2B	0.4
T14A	0.2	U3A	0.6
114B	0.2	U3B	0.5
T15A	0.5	U4	0.1
T15B	0.4	U5	0.2
T1A	0.3	U6	0.2
T1B	0.4	U7	0.4
T2A	0.2	U8	0.1
T2B	0.2	U9	0.7

Notes:

RBC = Risk Based Concentration.

RBC Ratio Sum = $\frac{241 \text{ Am activity}}{\text{RBC}} + \frac{239/240 \text{Pu activity}}{\text{RBC}}$

EG&G ROCKY FLATS ENVIRONMENTAL TECHNOLOGY SITE	EG&G	ROCKY	FLATS	ENVIRONMENTAL	TECHNOLOGY SITE
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TABLE 5-2

SOURCE AREA RBC RATIO SUMS FOR IHSS 200 SEDIMENTS AND GROUNDWATER ROCKY FLATS ENVIRONMENTAL TECHNOLOGY SITE

Source Area	Medium	RBC Ratio Sum - C	RBC Ratio Sum - NC
IHSS 200	Sediments	1 ^a	0.03 ^b
IHSS 200	Groundwater		0.3°
TOTAL		1	0.3

Notes:

C = Carcinogenic potential contaminants.

NC = Noncarcinogenic potential contaminants.

IHSS = Individual Hazardous Substance Site.

mg/L = milligrams per liter.

pCi/g = picocuries per gram.

^aFor ^{239/240} Pu: <u>4.04 pCi/g</u>

3.43 pCi/g = 1

^bFor Cu: 311 mg/kg

11,000 mg/kg

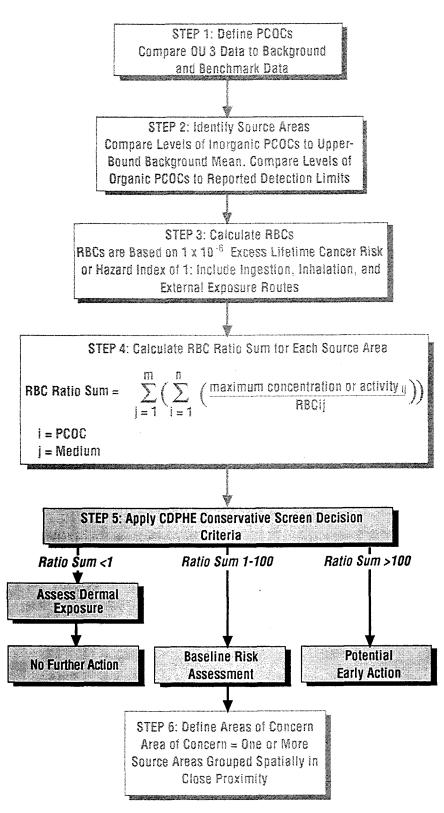
= 0.03

°For Sr: 5.59 mg/L

21.9 mg/L

= 0.3

Section 6.0
STEP 5: CDPHE CONSERVATIVE SCREEN DECISION CRITERIA



CDPHE = Colorado Department of Public Health and Environment

PCOC = Potential Chemical of Concern

RBC = Risk-Based Concentration

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EG&G ROCKY FLATS ENVIRONMENTAL TECHNOLOGY SITE CDPHE Conservative Screen Operable Unit 3

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6.0 STEP 5: CDPHE CONSERVATIVE SCREEN DECISION CRITERIA

Further actions for Source Areas are determined by the following decision criteria (CDPHE/EPA/DOE, 1994):

- If the RBC Ratio Sum for a Source Area is greater than or equal to 100, DOE may conduct a Voluntary Corrective Action for that portion of the OU.
- If the RBC Ratio Sum for a Source Area is between 1 and 100, DOE must conduct an HHRA for that Source Area, in accordance with <u>Risk Assessment</u>
 Guidance for Superfund (EPA, 1989a).
- If the RBC Ratio Sum for a Source Area is less than or equal to 1, no further action (i.e., a HHRA is not required) is required pending an evaluation of dermal exposure.

All RBC Ratio Sums for surface-soil Source Areas in OU 3 are either less than 1 (i.e., no further action is required pending dermal exposure evaluation) or in the 1 to 100 range (i.e., further evaluation in a HHRA is required). For those surface-soil Source Areas with RBC Ratio Sums less than 1, the CDPHE Conservative Screen decision criteria include an evaluation of dermal exposure. Dermal contact with surface soil in OU 3 is not considered to be a significant exposure pathway because radionuclides are not expected to be significantly absorbed through the skin (EPA, 1989a; EPA, 1989b). As a screening step to verify the assumption that dermal contact is not a significant exposure pathway, maximum activities of ²⁴¹Am and ^{239/240}Pu for surface-soil samples in each Source Area with a RBC Ratio Sum less than 1 were compared to a Dermal RBC (i.e., RBC based on exposure via dermal absorption). No activities for surface-soil samples in the OU 3 data set exceed the Dermal RBCs. The methods used to calculate the Dermal RBCs are presented in Appendix E, along with the results of the comparison.

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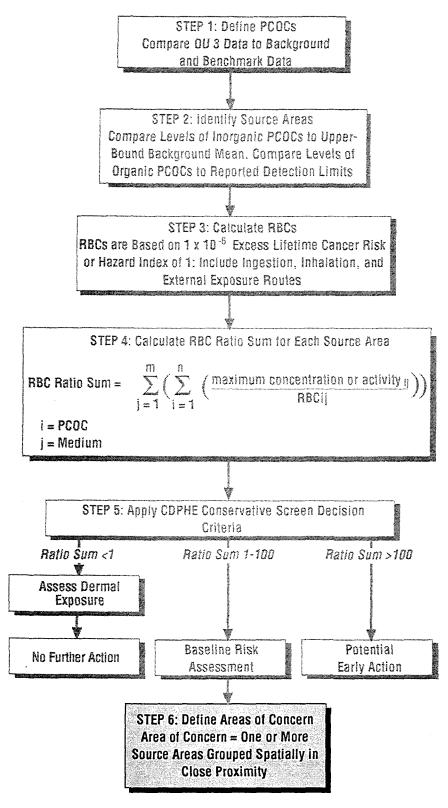
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The RBC Ratio Sum-C for the Great Western Reservoir (IHSS 200) Source Area is greater than 1. Therefore, further evaluation in a HHRA is required for Great Western Reservoir.

Based on the conservative screening process specified by CDPHE and the decision criteria described above, three surface-soil Source Areas (sample locations: PT14192, U1A, and U2A) and the Great Western Reservoir (IHSS 200) Source Area, require further evaluation in a HHRA. No further action is required for all other surface-soil Source Areas (18 RFI/RI soil-sampling locations and 45 Jefferson County Remedy Acres locations). In addition, no further action is required for Standley Lake (IHSS 201) or Mower Reservoir (IHSS 202) because no PCOCs were identified for those IHSSs.

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Section 7.0 STEP 6: AREAS OF CONCERN



CDPHE = Colorado Department of Public Health and Environment

PCOC = Potential Chemical of Concern

RBC = Risk-Based Concentration

EG&G ROCKY FLATS ENVIRONMENTAL TECHNOLOGY SITE CDPHE Conservative Screen Operable Unit 3

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7.0 STEP 6: AREAS OF CONCERN

Areas of Concern are defined as one or several Source Areas grouped spatially in close proximity (CDPHE/EPA/DOE, 1994). In the HHRA for OU 3, the three surface-soil Source Areas with RBC Ratio Sums greater than 1 (sample locations: PT14192, U1A, and U2A) will be considered as separate Areas of Concern because each of the three Source Areas represents an area large enough to be considered a single residential exposure area (i.e., approximately 10 acres), and the Source Areas are separated by areas that have RBC Ratio Sums less than 1 (i.e., tilled strips of the Jefferson County Remedy Acres). The Great Western Reservoir (IHSS 200) Source Area is considered an Area of Concern because the RBC Ratio Sum-C is greater than 1.

Section 8.0 REFERENCES

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Appendix A
CDPHE/EPA/DOE GUIDANCE
FOR CDPHE CONSERVATIVE SCREEN

EG&G ROCKY FLATS ENVIRONMENTAL TECHNOLOGY SITE CDPHE Conservative Screen Operable Unit 3

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APPENDIX A. CDPHE/EPA/DOE GUIDANCE FOR THE CDPHE CONSERVATIVE SCREEN

Appendix A contains copies of the following CDPHE/EPA/DOE guidance for the CDPHE Conservative Screen:

Attachment 1. Memorandum from Jessie Roberson (DOE, Memo Reference No. ER:SRG:03600), dated March 30, 1994, describing Data Aggregation methodologies, including the CDPHE Conservative Screen.

Attachment 2. Presentation materials from a meeting on June 3, 1994 sponsored by CDPHE, EPA, and DOE. The Data Aggregation process for RFP HHRAs was described at this meeting, including the CDPHE Conservative Screen and the COC selection process.

Attachment 3. Memorandum from Martin Hestmark (EPA) confirming the background comparison methodologies to be used for OU 3 (i.e., weight-of-evidence evaluations for analytes in reservoirs) as part of the Data Aggregation process.

P. 02

LESU 1300

United States Government

MAR-31-94 THU 10:21

Department of Energy

FAX NO. 4871

Rocky Flats Office

DATE

MAR 3 0 1994

memorandum

REPLYTO

ATTN OP:

ER:SRG:03600

SUBJECT:

Resumption of All Work on Operable Unit Baseline Risk Assessments

707

Sue Stiger, Associate General Manager Environmental Restoration Management EG&G Rocky Flats, Inc.

Memorandum ER:SRG:03599 provides instruction for you to resume all work associated with Environmental Restoration Operable Unit (OU) baseline risk assessments that were stopped by memorandum ERD:SRG:08450, dazed August 18, 1993.

We reference the following memorandums concerning resumption of work for contaminants of concern and statistical comparisons with background for the baseline risk assessments:

ERD:SRG:11731; October 13, 1993: resumption of Contaminant of Concern selection and statistical comparisons of data to background for OU2.

ERD:EAD:13759; December 22, 1993: resumption of statistical comparisons of data to

background for all operable units.

• EG&G memorandum 94-RF-02971 - SG-179-94; March 14: 1994: methodology for statistical comparisons of data to background.

We have just recently reached agreement with the Environmental Protection Agency (EPA) and the Colorado Department of Health on the methodology for data aggregation and the methodology is attached.

You are directed to revise the schedules for the Operable Units to incorporate the agreedupon risk assessment methodology by April 25, 1994. In particular, the data aggregation methodology represents additional work or modifications to work" as per Part 32 of the Interagency Agreement (IAG). As a result, we must determine revised schedules and cost, including the additional scope to incorporate the revised methodology, and make a request to EPA and CDH as per Part 42 (Extensions) of the IAG.

Your April 25, 1994 deliverable to us will include schedule extensions for all Operable Units affected by the stoppage of work, and will specifically denote the time needed (with sufficient rationale) for the "additional work." This is an important distinction because the IAG allows a day-for-day schedule extension (Paragraph 164 of the IAG) for the time the work stoppage was in affect and a schedule extension should easily be granted. However, the time needed for additional work is not as straightforward, and as a result, needs a substantial rationale to support the request for additional time needed.

S. Stiger ER-SRG-03600

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MAR 3 U 1994

If you have any questions please contact Frazer Lockhart at extension 7846.

Acting Assistant Manager for Environmental Restoration

oc w/attachment

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DATA AGGREGATION FOR HEALTH EXPOSURE ASSESSMENT

Specific Data Aggregation Methodology for Rocky Flats

The first consideration of data aggregation is the exposure scenario (land use). Example exposure areas for the Rocky Flats Plant site may be (I) for the industrial/commercial land use scenario, the area of a typical industrial park (2) for the ecological preserve scenario, the area of a preserve, and (3) for the residential land use scenario, the area of a residential neighborhood unless the consideration of a receptor's activity patterns and the mechanisms of toxicity of a particular contaminant indicate that a residential lot size is appropriate.

Following the application of the attached conservative screen (which identifies areas of elevated contaminant concentration which will be the focus of the baseline risk assessment), data must be aggregated for each environmental medium to arrive at the exposure point concentration estimate which will be used in the exposure assessment. Aggregation of all contaminant data, including data below background or detection limits, will be accomplished over the scenario-specific exposure areas within the area of concern identified by the screening process. The recommended data aggregation procedure is as follows:

- 1) Identify the exposure scenario(s) which will be assessed.
- Agree on the size of the exposure area for each scenario by considering the receptors, the toxicity of the contaminants of concern (COCs), the exposure pathways, and contaminant variability. Determination of the appropriate exposure area requires an understanding of the mechanisms of toxicity as well as the concepts of exposure. For this reason, experienced risk assessors, toxicologists, and health physicists from all three agencies (EPA, CDH, and DOE) must be consulted.
- 3) Plot the COC data, including data points below background or detection limit, on a map of the operable unit, delineating the area of concern*.
- 4) Consult with toxicologists and health physicists from all three agencies (EPA, CDH, and DOE) to place a grid of exposure areas over the area of concern. The grid placement must be approved by the three agency toxicologists and health physicists due to considerations of mechanisms of toxicity. Of course, involvement of other scientific disciplines will also be required.
- * Area of Concern = One or several sources** grouped spatially in close proximity.
- ** Source = Area defined by (1) contaminant levels exceeding background mean plus 2 standard deviations for inorganics and/or (2) detection limits for organics.

- Site (OSWER Directive 9285.7-09A, April, 1992, p. 55). Generally this requires aggregation of data and a subsequent calculation of risk within each exposure area. This is especially important for heterogeneous data sets. However, at the Rocky Flats site, all pantes agree that it is sufficient to calculate risks for only one exposure area per source: the exposure area associated with the highest risk, identified by considering the concentrations of COCs, the affected environmental media, and the number of exposure pathways. If the exposure area associated with the highest risk is not readily identifiable, several exposure areas may be analyzed. This decision will be made on a case-by-case basis. In general, not more than one exposure area per source will need to be evaluated unless the exposure pathways differ between exposure areas within the source. Data within the exposure area(s) will be aggregated using the following procedure:
 - a. Using the complete operable unit data set, determine the statistical distribution for each COC in each environmental media. Present the statistical distribution graphically, along with the data plotted in a histogram which presents the frequency of detection and the magnitude.
 - b. Use EPA's "Supplemental Guidance to RAGS: Calculating the Concentration Term* to calculate the 95th percent upper confidence limit (95% UCL) of the arithmetic mean over each exposure area for each COC. If the COC data is log-normally distributed, highlight 5 of this guidance document should be used. If the COC data is normally distributed or is determined to be non-parametric, highlight 6 should be used. The guidance states that calculation of the 95% UCL using data sets with fewer than 10 samples per exposure area provides a poor estimate of the mean concentration. Data sets with 20 to 30 samples per exposure area provide fairly consistent estimate of the mean. All parties agree that uncertainties in the estimates of the mean concentrations will be addressed in the uncertainty analysis. For OUs 2-7, additional field sampling in support of baseline risk assessment must be mutually agreed to by EPA, CDH, and DOE. On a case-by-case basis, with the approval of the regulators, geostatistics may be utilized to incorporate spatial continuity of data,
- 6) Use the results of step 5(b) as the exposure point concentration term in the exposure assessment. Consider all COCs in calculating cumulative risks for each exposure area analyzed.

Summary

The above procedure provides the arithmetic average of the exposure concentration that is expected to be contacted over the exposure period within the exposure area associated with the maximum risk within the source. Although this concentration does not reflect the maximum concentration that could be contacted at any one time, it is explicitly stated in OSWER Publication 9285.7-081, "Supplemental Guidance to RAGS: Calculating the Concentration Term", the average is used for two reasons:

- 1. carcinogenic and chronic noncarcinogenic toxicity criteria are based on lifetime average exposures; and
- 2. average concentration is most representative of the concentration that would be contacted over time if it is assumed that an exposed individual moves randomly across an exposure area.

Considerations of risk due to exposure to a source of contamination will be addressed because all COC data will be considered with respect to how a potential receptor may be exposed, not simply how the contamination is distributed in the environment.

STATE OF COLORADO

COLORADO DEPARTMENT OF HEALTH
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Roy Roman

Politicis A. Nober, MD, MP. Seconds Director

March 30, 1994

Mr. Robert L. Duprey, Director Hazardous Waste Management Division U.S. Environmental Protection Agency Region VIII 999 18th Street, Suite 500, 8WM-C Denver, Colorado 80202-2405

RE: Resolution of Data Aggregation/Baseline Risk Assessment Dispute at the Rocky Flats Plant

Dear Mr. Duprey,

The Colorado Department of Health, Hazardous Materials and Waste Management Division (the Division), hereby concurs with BPA's proposed resolution to the above referenced dispute. However, we do so with the following conditions:

- 1) The attached language explaining how the "conservative risk screen" will be conducted will be added to your proposal. This language has been reviewed by your staff and DOR staff and is, as far as we know, acceptable to both. As this screen is the first step in the risk evaluation process, we feel it is valuable to add explicit language to this proposal so that consistent correct application of the screen may be achieved.
- 2) The following changes are made to the text of your proposal as agreed to in staff conference calls on March 24 and 25, 1994:

a) first page, first paragraph, second sentence changed to "Example exposure areas for the Rocky Flats Plant site may be . . . "

b) second page, first paragraph, sixth sentence replaced with "This will be made on will be made on a case-by-case basis."

c) second page, third paragraph, fourth and fifth sentences changed to "The guidance states that . . . fewer than 10 samples per exposure area provides a poor estimate of the mean concentration. Data sets with 20 to 30 samples per

Conservative Risk Screen for Sources at the Rocky Plats Plant

This rick screen will be the first step in the risk assessment process used at Rocky Flats and will be the basis and justification for the type of next steps taken at a given OU (please see attached flow-chart).

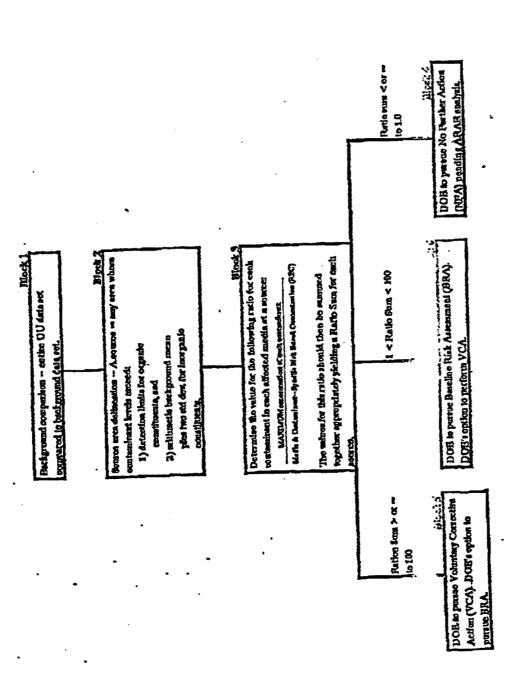
The steps in the conservative risk screen are as follows: . .

- 1. An entire OU RFI/RI data base will be compared to background using the previously agreed upon Gilbert methodology. (flowchart, block 1)
 - The product of the background comparison will be a list of potential contaminants in the OU. This list will consist of all organic chemicals that exceed detection limit somewhere in the OU, and all inorganic chemicals whose OU population exhibits a significant statistical increase in concentrations compared to the background population either over the whole OU or within some portion of the OU.
- 2. This list of potential contaminants will be used as the basis for the "nature and extent" evaluation for each OU. Within this evaluation, source areas will be delineated. For organic chemicals on the list, the delineation criteria will be the delection limit; for inorganic chemicals on the list, the delineation criteria will be the arithmetic mean of the background data set plus two standard deviations from the arithmetic mean. (flowchart, block 2)
 - It is recognized that each chemical in each medium may have a different spatial extent within a source. These different spatial extents do not affect the implementation of this screen. A *source, * however, will be all contamination that can reasonably be tied together based on existing knowledge of the site, contaminant types, concentrations, rates of migration, etc.
- 3. For each potential contaminant in each medium, a mediumspecific "risk based concentration", or RBC, must be
 calculated. These RBCs should be calculated based on: 1)
 direct "residential" exposure and intake parameters, 2) direct
 ingestion, dermal contact, and inhalation pathways only, and
 3) assuming a carcinogenic risk of 1X10" and a noncarcinogenic hazard quotient of 1.0. (These RBCs could be
 calculated once <u>site-wide</u> since they are chemical-specific and
 not location specific.)

Source = Area defined by 1) contaminant levels exceeding bankground mean plus 2 standard deviations for inorganics and/or 2) detection limits for organics

- 4. For each source delineated in #2 above, it is necessary to determine the maximum contaminant levels for each potential contaminant in each affected medium.
- 5. On: the maximum contaminant levels have been determined, each mc.ia/contaminant-specific maximum should be divided by its mc.ia/contaminant-specific maximum/HBC ratios for each contaminant the meetive RBC. These maximum/HBC ratios for each contaminant should then be summed for each medium and then across all affected media in a source. Those sources where the ratio sum is less than 1.0 have a risk less than 1x10-4 and/or a hazard questient less than 1.0. Those sources where the ratio sum is greater than 1.0 have a risk greater than 1x10-4 and/or a butter quotient greater than 1.0. (flowchart, block 3)
- 6. For sources where the ratio sum was less than 1.0, TOR would pursus a "no further action" decision, pending an ARAR arraysis (flowchart, block 4). For sources that have a ratio s: greater than 100, DOE would pursue a "voluntary corrective at ion" but could proceed with a Baseline Risk Arussment (I W) at their discretion (flowchart, block 5). For sources we set the ratio sum was between 1.0 and 100, DOE would pursue a RA, but could perform a voluntary corrective action at the discretion (flowchart, block 6).

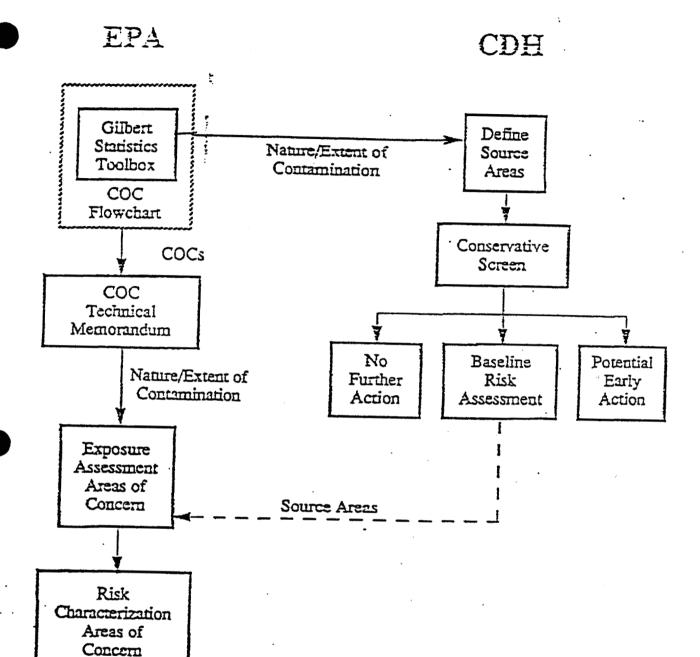
CONSERVATIVE RISK SCREEN



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CDH CONSERVATIVE SCREEN STEP

DEFINE THE POTENTIAL CONTAMINANTS FOR EACH OPERABLE UNIT,

- INORGANIC CONSTITUENTS SIGNIFICANTLY GREATER THAN BACKGROUND (GILBERT APPROACH)
- ORGANIC CONSTITUENTS GREATER THAN **DETECTION LIMIT**

CDH CONSERVATIVE SCREEN STEP 2

IDENTIFY SOURCES

- PLUS 2 STANDARD DEVIATIONS OF BACKGROUND INORGANIC SOURCE AREA IS DEFINED BY ALL CONTAMINATION ABOVE ARITHMETIC MEAN **POPULATION**
- ORGANIC SOURCE AREA IS DEFINED BY ALL CONTAMINATION ABOVE DETECTION LIMIT

HOW ARE OVERLAPPING SOURCES HANDLED?

REASONABLY BE TIED TOGETHER BASED ON EXISTING KNOWLEDGE OF THE SITE, CONTAMINATION TYPES, "A SOURCE WILL BE ALL CONTAMINATION THAN CAN CONCENTRATIONS, RATES OF MIGRATION, ETC. "

CDH CONSERVATIVE SCREEN STEP 3

CONTAMINANT IN EACH MEDIUM. USE THE FOLLOWING ASSUMPTIONS: CALCULATE A RISK BASED CONCENTRATION FOR EACH POTENTIAL

RESIDENTIAL LAND USE

INGESTION, INHALATION, EXPOSURE PATHWAYS

CARCINOGENIC RISK LEVEL SET AT 1 X 10-6

NONCARCINOGENIC HAZARD QUOTIENT SET AT 1.0

CDH CONSERVATIVE SCREEN STEP 4

FOR EACH SOURCE AREA IDENTIFIED IN STEP 2, CALCULATE THE RATIO:

MAXIMUM DETECTED LEVEL OF CONTAMINANT;) (RISK BASED CONCENTRATION OF CONTAMINANT,

SUM THIS RATIO OVER ALL CONTAMINANTS (i = 1 to N); AND OVER ALL MEDIA WITHIN A SOURCE AREA

CDH CONSERVATIVE SCREEN DECISION CRITERIA:

IF RATIO SUM ≥ 100 , DOE MAY CONDUCT A VOLUNTARY CORRECTIVE ACTION

BASELINE RISK ASSESSMENT IN ACCORDANCE WITH THE RISK ASSESSMENT GUIDANCE FOR SUPERFUND IF I < RATIO SUM < 100, DOE MUST CONDUCT A

IF RATIO SUM < 1, NO FURTHER ACTION PENDING ARAR ANALYSIS AND DERMAL EXPOSURE **EVALUATION**

DERMAL EXPOSURE ASSESSMENT CONSIDERATIONS

(CUMULATIVE RISK < 10°), MUST BE FURTHER CONSIDERED AS FOLLOWS: SOURCES WITH RATIO SUM <1

INCLUDE AN EVALUATION OF DERMAL CONTACT PER EPA GUIDANCE* ON A CHEMICAL SPECIFIC BASIS

DERMAL EXPOSURE ASSESSMENT: PRINCIPLES AND APPLICATIONS, EPA/600/8-91/001B

AREA OF CONCERN

"ONE OR SEVERAL SOURCES GROUPEI SPATIALLY IN CLOSE PROXIMITY"

-DEFINED AFTER SOURCE AREAS HAVE BEEN SCREENED BY THE CDH CONSERVATIVE SCREEN-

OUTPUTS OF THE CDH CONSERVATIVE SCREEN:

POTENTIAL EARLY ACTION SOURCE AREAS

NO FURTHER ACTION SOURCE AREAS

AREA OF CONCERN WHICH WILL BE THE FOCUS OF THE SUPERFUND BASELINE RISK ASSESSMENT

Per Gilbert Methodology Previously agreed upon.	Per "nature and extent" evaluation.			RBCs based on: 1) Direct "residential"	2) Direct ingestion inhalation,	and dermal contact, 3) 10E-6 carcinogenio risk and	1,0 hazard quotient	Ratio sum < or = to 1.0	Block 4	analysis.
								Rati		DOE to pursue No Further Action (NFA) pending ARAR analysis.
ire OU data set compared	ource = any arca where	limits for organic constituents, and std dev. for inorganic constituents.		following ratio for each media at a source:	n of each contaminant	Risk Based Concentration (RBC)	uld then be summed ig a Ratio Sum for each	1 < Ration Sum < 100	Bock 6	Risk E's
Background comparison - entire OU data set compared to background data set.	Source area delineation - A source = any area where contaminant levels exceed:	 Detection limits for orga Plus two std dev. for in 		Determine the value for the following ratio for each contaminant in each affected media at a source: Maximum concentration of each contaminant	Maximum concentration of each contaminant	Media & Contaminant - Specific Risk Based Concentration (RBC)	The values for this ratio should then be summed together appropriately yielding a Ratio Sum for each source.	= to 100		DOE to pursue Baseline Risk Assessment (BRA). DOE's option to perform VCA.
			•					Ration Sum > or = to 100	Dlock 5	DOE to pursue Voluntary Corrective Action (VCA), DOE's option to pursue BRA.

HUMAN HEALTH BASELINE RISK ASSESSMENT DATA AGGREGATION

STEP 1: IDENTIFY CONTAMINANTS OF CONCERN (COCs)

STEP 2: IDENTIFY THE REASONABLE MAXIMUM EXPOSURE SCENARIO(S)

STEP 3: AGREE ON THE SIZE OF THE EXPOSURE AREA BY CONSIDERING

* TOXICITY OF THE COCS

* EXPOSURE PATHWAYS

* DATA VARIABILITY

* RECEPTOR ACTIVITY PATTERNS

DOCUMENT THE AGREEMENT REACHED IN STEP 3 AND OBTAIN CONSENSUS AMONG ALL THREE AGENCIES' RISK ASSESSORS, TOXICOLOGISTS, AND HEALTH PHYSICISTS

HUMAN HEALTH BASELINE RISK ASSESSMENT DATA AGGREGATION

STEP 4: PLOT ALL DATA FOR THE COCS WHICH ARE WITHIN THE AREA OF CONCERN ON A MAP OF THE OPERABLE UNIT

THE AREA OF CONCERN MAP WITH DATA. THIS WILL REQUIRE CONSENSUS AMONG ALL THREE AGENCIES' RISK ASSESSORS, STEP 5: PLACE A GRID OF THE AGREED UPON EXPOSURE AREA OVER TOXICOLOGISTS, AND HEALTH PHYSICISTS.

HUMAN HEALTH BASELINE RISK ASSESSMENT DATA AGGREGATION

STEP 6: WITHIN EACH AREA OF CONCERN, IDENTIFY THE EXPOSURE AREA FROM THE GRID WHICH IS ASSOCIATED WITH THE HIGHEST RISK. CONSIDER:

- * COC CONCENTRATIONS AND TOXICITY
- * CONTAMINATED MEDIA (MULTIPLE OR SINGLE)
- * EXPOSURE PATHWAYS

"SUPPLEMENTAL GUIDANCE TO RAGS: CALCULATING THE CONCENTRATION TERM" AS GUIDANCE. STEP 7: CALCULATE THE 95% UCL OF THE ARITHMETIC MEAN FOR EACH COC OVER THE EXPOSURE AREA. USE EPA'S

SUGGESTED REGULATORY AGENCY APPROVAL POINTS

CDH CONSERVATIVE SCREEN:

STEP 2: SOURCE IDENTIFICATION MAP

STEP 4: A LETTER REPORT WHICH INCLUDES:

CONCENTRATIONS, AND RATIO FOR EACH SOURCE AREA TABLE OF POTENTIAL CONTAMINANTS, RISK BASED

DISCUSSION OF DECISION CRITERIA

MAP OF AREA(S) OF CONCERN

SUGGESTED REGULATORY AGENCY APPROVAL POINTS

HHRA DATA AGGREGATION:

STEP 1: COC TECHNICAL MEMORANDUM AS PLANNED

STEP 2: EXPOSURE SCENARIO TECHNICAL MEMORANDUM AS PLANNED

STEP 3: MEETING BETWEEN HEALTH PROFESSIONALS AND RISK ASSESSORS WITH A FOLLOWUP LETTER DOCUMENTING AGREEMENT

THE ONE OR SEVERAL CHOSEN TO REPRESENT HIGHEST RISK. ASSESSORS RESULTING IN A MAP OF EXPOSURE AREAS AND MAY REQUIRE MULTIPLE MAPS DEPENDING ON EXTENT OF STEP 5: MEETING BETWEEN HEALTH PROFESSIONALS AND RISK CONTAMINATED MEDIA

STEPS 6 & 7 BECOME PART OF THE BASELINE RISK ASSESSMENT

Conservative Risk Screen for Sources(1) at the Rocky Flats Plant

This risk screen will be the first step in the risk assessment process used at Rocky Flats and will be the basis and justification for the type of next steps taken at a given OU (please see attached flow-chart).

The steps in the conservative risk screen are as follows:

- 1. An entire OU RFI/RI data base will be compared to background using the previously agreed upon Gilbert methodology. (flowchart, block 1)
 - The product of the background comparison will be a list of potential contaminants in the OU. This list will consist of all organic chemicals that exceed detection limit somewhere in the OU, and all inorganic chemicals whose OU population exhibits a significant statistical increase in concentrations compared to the background population either over the whole CU or within some portion of the OU.
- 2. This list of potential contaminants will be used as the basis for the "nature and extent" evaluation for each OU. Within this evaluation, source areas will be delineated. For organic chemicals on the list, the delineation criteria will be the detection limit; for inorganic chemicals on the list, the delineation criteria will be the arithmetic mean of the background data set plus two standard deviations from the arithmetic mean. (flowchart, block 2)
 - It is recognized that each chemical in each medium may have a different spatial extent within a source. These different spatial extents do not affect the implementation of this screen. A "source," however, will be all contamination that can reasonably be tied together based on existing knowledge of the site, contaminant types, concentrations, rates of migration, etc.
- 3. For each potential contaminant in each medium, a mediumspecific "risk based concentration", or RBC, must be
 calculated. These RBCs should be calculated based on: 1)
 direct "residential" exposure and intake parameters, 2) direct
 ingestion, dermal contact, and inhalation pathways only, and
 3) assuming a carcinogenic risk of 1x10" and a noncarcinogenic hazard quotient of 1.0. (These RBCs could be
 calculated once site-wide since they are chemical-specific and
 not location specific.)

Source = Area defined by 1) contaminant levels exceeding background mean plus 2 standard deviations for impressions and/or 2) detection limits for organics

- 4. For each source delineated in #2 above, it is necessary to determine the maximum contaminant levels for each potential contaminant in each affected medium.
- 5. Once the maximum contaminant levels have been determined, each media/contaminant-specific maximum should be divided by its respective REC. These maximum/REC ratios for each contaminant should then be summed for each medium and then across all affected media in a source. Those sources where the ratio sum is less than 1.0 have a risk less than 1X10° and/or a hazard quotient less than 1.0. Those sources where the ratio sum is greater than 1.0 have a risk greater than 1X10° and/or a hazard quotient greater than 1.0. (flowchart, block 3)
- 6. For sources where the ratio sum was less than 1.0, DOE would pursue a "no further action" decision, pending an APAR analysis (flowchart, block 4). For sources that have a ratio sum greater than 100, DOE would pursue a "voluntary corrective action" but could proceed with a Easeline Risk Assessment (BRA) at their discretion (flowchart, block 5). For sources where the ratio sum was between 1.0 and 100, DOE would pursue a ERA, but could perform a voluntary corrective action at their discretion (flowchart, block 6).

Per Gilbert Methodology Previously agreed upon.	Per "nature and extent" evaluation.		RBCs based on: 1) Direct "residential" exposure parameters	2) Direct ingestion inhalation,	and dermal contact, 3) 10E-6 carcinogenic risk and	1,0 hazard quotient	Ratio sum < or = to 1.0	Block 4	DOE to pursue No Further Action (NFA) pending ARAR analysis.
comparison - entire OU data set compared and data set.	delineation - A source = any area where levels exceed:	n limits for organic constituents, and std dev. for inorganic constituents.	re value for the following ratio for each in each affected media at a source:	of each contaminant	sk Based Concentration (RBC)	I then be summed a Ratio Sum for each	1 < Ration Sum < 100	Bock 6	
Background comparison - entire to background data set.	Source area delineation - A sou contaminant levels exceed:	1) Detection limits for organic constituents, and 2) Plus two std dev. for inorganic constituents.	Determine the value for the following ratio for contaminant in each affected media at a source:	Maximum concentration of each contaminant	Media & Contaminant - Specific Risk Based Concentration (RBC)	The values for this ratio should then be summed together appropriately yielding a Ratio Sum for each source.		S	DOE to pursue Baseline Risk Assessment (BRA). DOE's option to perform VCA.
							Ration Sum > or = to 100	Block 5	DOE to pursue Voluntary Corrective Action (VCA), DOE's option to pursue BRA.

DATA AGGREGATION FOR HUMAN HEALTH EXPOSURE ASSESSMENT

Specific Data Aggregation Methodology for Rocky Flats

The first consideration of data aggregation is the exposure scenario (land use). Example exposure areas for the Rocky Flats Plant site may be (1) for the industrial/commercial land use scenario, the area of a typical industrial park (2) for the ecological preserve scenario, the area of a preserve, and (3) for the residential land use scenario, the area of a residential neighborhood unless the consideration of a receptor's activity patterns and the mechanisms of toxicity of a particular contaminant indicate that a residential lot size is appropriate.

Following the application of the attached conservative screen (which identifies areas of elevated contaminant concentration which will be the focus of the baseline risk assessment), data must be aggregated for each environmental medium to arrive at the exposure point concentration estimate which will be used in the exposure assessment. Aggregation of all contaminant data, including data below background or detection limits, will be accomplished over the scenario-specific exposure areas within the area of concern identified by the screening process. The recommended data aggregation procedure is as follows:

- 1) Identify the exposure scenario(s) which will be assessed.
- Agree on the size of the exposure area for each scenario by considering the receptors, the toxicity of the contaminants of concern (COCs), the exposure pathways, and contaminant variability. Determination of the appropriate exposure area requires an understanding of the mechanisms of toxicity as well as the concepts of exposure. For this reason, experienced risk assessors, toxicologists, and health physicists from all three agencies (EPA, CDH, and DOE) must be consulted.
- 3) Plot the COC data, including data points below background or detection limit, on a map of the operable unit, delineating the area of concern.
- Consult with toxicologists and health physicists from all three agencies (EPA, CDH, and DOE) to place a grid of exposure areas over the area of concern. The grid placement must be approved by the three agency toxicologists and health physicists due to considerations of mechanisms of toxicity. Of course, involvement of other scientific disciplines will also be required.
 - Area of Concern = One or several sources grouped spatially in close proximity
 - * Source = Area defined by 1) contaminant levels exceeding background mean plus 2 standard deviations for inorganics and/or 2) detection limits for organics

- Risk assessment requires characterization of each exposure area for the site (OSWER Directive 9285.7-09A, April, 1992, p.55). Generally this requires aggregation of data and a subsequent calculation of risk within each exposure area. This is especially important for heterogeneous data sets. However, at the Rocky Flats site, all parties agree that it is sufficient to calculate risks for only one exposure area per source: the exposure area associated with the highest risk, identified by considering the concentrations of COCs, the affected environmental media, and the number of exposure pathways. If the exposure area associated with the highest risk is not readily identifiable, several exposure areas may be analyzed. This decision will be made on a case by case basis. In general, not more than one exposure area per source will need to evaluated unless the exposure pathways differ between exposure areas within the source. Data within the exposure area(s) will be aggregated using the following procedure:
 - a. Using the complete operable unit data set, determine the statistical distribution for each COC in each environmental media. Present the statistical distribution graphically, along with the data plotted in a histogram which presents the frequency of detection and the magnitude.
 - b. Use EPA's "Supplemental Guidance to RAGS: Calculating the Concentration Term" to calculate the 95th percent upper confidence limit (95% UCL) of the arithmetic mean over each exposure area for each COC. If the COC data is lognormally distributed, highlight 5 of this guidance document should be used. If the COC data is normally distributed or is determined to be non-parametric, highlight 6 should be used. The guidance states that calculation of the 95% UCL using data sets with fewer than 10 samples per exposure area provides a poor estimate of the mean concentration. Data sets with 20 to 30 samples per exposure area provide fairly consistent estimate of the mean. All parties agree that uncertainties in the estimates of the mean concentrations will be addressed in the uncertainty analysis. For Operable Units 2 through 7, additional field sampling in support of baseline risk assessment must be mutually agreed to by EPA, CDH, and DOE. On a case by case basis, with the approval of the regulators, geostatistics may be utilized to incorporate spatial continuity of data.
- 6) Use the results of step 5(b) as the exposure point concentration term in the exposure assessment. Consider all COCs in calculating cumulative risks for each exposure area analyzed.

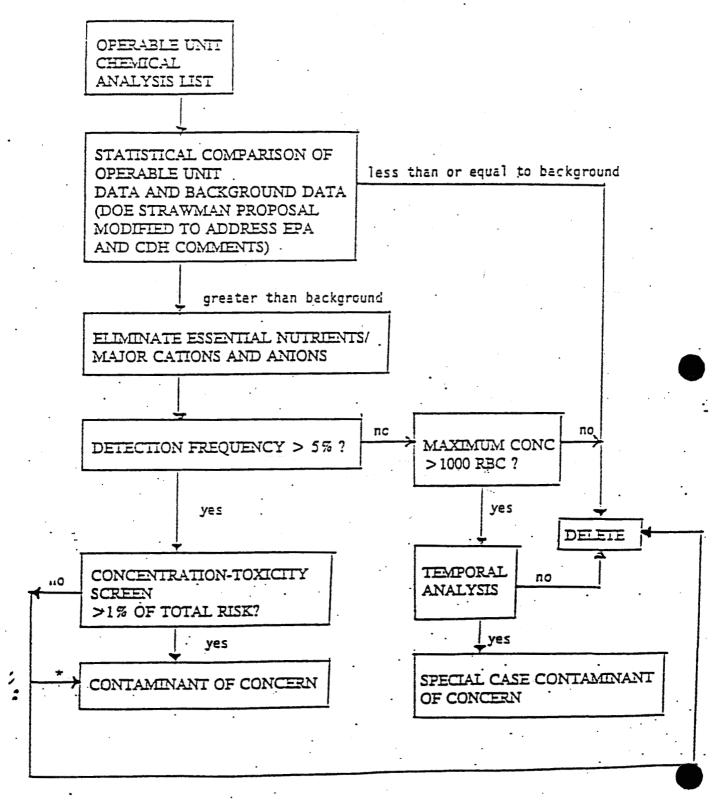
Summary

The above procedure provides the arithmetic average of the exposure concentration that is expected to be contacted over the exposure period within the exposure area associated with the maximum risk within the source. Although this concentration does not reflect the maximum concentration that could be contacted at any one time, it is explicitly stated in OSWER Publication 9285.7-081, "Supplemental Guidance to RAGS: Calculating the Concentration Term", the average is used for two reasons:

- I. carcinogenic and chronic noncarcinogenic toxicity criteria are based on lifetime average exposures; and
- 2. average concentration is most representative of the concentration that would be contacted over time if it is assumed that an exposed individual moves randomly across an exposure area.

Considerations of risk due to exposure to a source of contamination will be addressed because all COC data will be considered with respect to how a potential receptor may be exposed, not simply how the contamination is distributed in the environment.

CONTAMINANTS OF CONCERN SELECTION PROCESS



professional judgement



UNITED STATES FNVIRONMENTAL PROTECTION AGENCY REGION VIII

999 18th SINEE! - SUITE 500 DENVER, COLORADO 80202-2466

MAR 24 1994

Ref: 8HWM-FF

Mr. Richard Schassburger U.S. Department of Energy Rocky Flats Office P.O. Box 928 Golden, CO 80402-0928

> RE: Operable Unit 3 Comparisons to Background Data

Dear Mr. Schassburger:

Representatives of EPA, CDH, and DOE contractors met on March 10, 1994, to discuss options for comparing the remedial investigation data collected from Mower Reservoir, Standley Lake Reservoir, and Great Western Reservoir to background data. The intent of this letter is to document the agreement reached at this meeting.

EPA and CDH agree that a weight of evidence approach may be used to address the question of whether metals and radionuclides in the reservoirs are above background levels. The evidence considered should include, but may not be limited to the following:

- 1. A comparison of stream sediment data in the Operable Unit 3 (OU 3) drainages to background concentrations of stream sediments in the Background Geochemical Report. Those constituents above background in the drainages should be considered as potentially above background in the reservoirs.
- 2. A comparison of reservoir data to appropriate background Values taken from the existing scientific literature.
- 3. A consideration of the results of remedial investigation sediment sampling in the Woman Creek and the Walnut Creek drainages (Operable Unit 5 and Operable Unit 6) to determine potential releases into the off site reservoirs.

We understand that this approach deviates from the standard protocol for making background comparisons at the Rocky Flats site which was recommended by Dr. Richard Gilbert of Battelle Pacific Northwest Laboratories and accepted by all three Interagency Agreement parties in a facilitated process (BPA letter dated October 25, 1993; CDH letter dated

October 13, 1993). The protocol is highly statistically based. A key assumption is that the background data set is representative.

The available data characterizing background concentrations of reservoir sediments is sparse, therefore, a deviation from Dr. Gilbert's approach is warranted in the case of OU 3 reservoir sediments. In fact, we believe that if DOE were to use Dr. Gilbert's approach, the conclusions would be less supportable than a weight of evidence approach.

If there are any questions regarding this issue, please direct them to Bonnie Lavelle of EPA at (303) 294-1067, or Dave Norberry of CDH at (303) 692-3415.

Sincerely,

Mari Her 2

Martin Hestmark, Manager Rocky Flats Project

cc: Bob Birk, DOE "Mark Buddy, "EG&G." Joe Schieffelin, CDH Dave Norberry, CDH

NOTICE

All drawings located at the end of the document.

Appendix B
SUMMARY STATISTICS FOR OU 3
DATA AND BENCHMARK DATA

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APPENDIX B. SUMMARY STATISTICS FOR OU 3 DATA AND BENCHMARK DATA

Appendix B presents a statistical summary of OU 3 data and benchmark data for sediment, surface water, and groundwater. It should be noted that the summary statistics were developed after data protocols were applied but before the COC selection process. Summary statistics were performed on the Data Analysis table of the OU 3 database (See Appendix A of TM 4 [DOE, 1994b] for description of the Data Analysis table and the OU 3 database). The summary statistics for each analyte by IHSS and type includes: number of detects, number of samples, frequency of detection, minimum and maximum nondetected values, minimum and maximum detected values, arithmetic mean, standard deviation, and coefficient of variation.

Following, is a list of Summary Statistics of OU 3 data with a comparison to benchmark data. The tables are grouped by media, IHSS, and type (lake or creek):

Table B-1

Summary Statistics for OU 3 Surface Sediments; Comparison to Benchmark
Data

Table B-2

Summary Statistics for OU 3 Subsurface Sediments; Comparison to Benchmark
Data

Table B-3

Summary Statistics for OU 3 Surface Water; Comparison to Benchmark Data

Table B-4

Summary Statistics for OU 3 Groundwater; Comparison to Benchmark Data

EG&G ROCKY FLATS ENVIR CDPHE Conservative Screen for Operable Unit 3	Screen	EG&G ROCKY FLATS ENVIRONMENTAL TECHNOLOGY SITE CDPHE Conservative Screen for Operable Unit 3	/ SITE							Section:				Appendix B
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						Ta	Table B-1	-						
					SUMMARY	STATISTICS FO	Y STATISTICS FOR OU 3 SURFACE SE COMPARISON TO BENCHMARK DATA	SUMMARY STATISTICS FOR OU 3 SURFACE SEDIMENTS COMPARISON TO BENCHMARK DATA						
					Number of	l _	Frequency of	Minimum Nondetected	Maximum Nondetected	Minimum Detected	Maximum Detected		1	Coefficient of
Chemical Name	a E	Data Source	Lake or Creek	Area	Detects	Samples	Detection	Value	Value	value	Value	Mean	Devlation	Variation
ALUMINUM	mg/kg	BGCR	CREEK	8	29	59	6.			549.00	25200.00	5887.610	4912.73	
ALUMINUM	mg/kg	IHSS 200	CREEK	s	8	60	1.00			2220.00	13800.00	8233.750	3848.05	0.47
ALUMINUM	mg/kg	IHSS 201	CREEK	တ	4	4	1.00			1900.00	33200.00	8030.714	7958.47	0.99
ALUMINUM	mg/kg	IHSS 202	CREEK	တ	4	4	1.00			9110.00	15200.00	11227.500	2718.15	0.24
ALUMINUM	mg/kg	LOWRY	CREEK	63							32100.00	13959.330	7080.88	
ALUMINUM	mg/kg	CC-BM	LAKE	60						96700.00	96700.00			
ALUMINUM	mg/kg	IHSS 200	LAKE	တ	8	36	1.00			4530.00	20800.00	10910.833	4212.31	0.39
ALUMINUM	mg/kg	IHSS 201	LAKE	တ	43	43	1.00			852.00	23500.00	9834.814	6623.01	0.67
ALUMINUM	mg/kg	IHSS 202	LAKE	တ	1.	15	1.00			7480.00	18300.00	14370.000	3096.10	0.22
ANTIMONY	mg/kg	BGCR	CREEK	8						0.80	12.40	3.290	2.73	
ANTIMONY	mg/kg	IHSS 200	CREEK	တ	2		0.63	1.80	2.40	6.50	11.30	6.469	3.84	0.59
ANTIMONY	mg/kg	IHSS 201	CREEK	s		13	0.08	2:30	6.70	6.40	6.40	3.708	1.60	0.43
ANTIMONY	mg/kg	IHSS 202	CREEK	s	-	4	0.25	5.25	6.15	16.50	16.50	8.300	5.48	99.0
ANTIMONY	mg/kg	IHSS 200	LAKE	s	9	15	0.40	2.40	3.10	5.90	13.20	5.017	3.49	0.70
ANTIMONY	mg/kg	IHSS 201	LAKE	Ø	6	21	0.14	1.75	7.55		6.90	3.181	1.72	0.54
ANTIMONY	mg/kg	IHSS 202	LAKE	ဟ	-	9	0.17	4.60	44.40	17.30	17.30	14.858	15.23	1.03
ARSENIC	mg/kg	BGCR	CREEK	8	æ	29	0.90			0.20	17.30	2.410	2.45	
ARSENIC	mg/kg	HSS 200	CREEK	တ	60	80	1.00			3.70	9.40	5.313	1.85	0.35
ARSENIC	mg/kg	HSS 201	CREEK	s	7	14				2.20	7.80	4.764	1.53	0.32
ARSENIC	mg/kg	HSS 202	CREEK	တ	4	4	1.00			3.00	6.80	4.875	1.56	0.32
ARSENIC	mg/kg	LOWRY	CREEK	60							16.50	4.810	3.95	
ARSENIC	mg/kg	CC-BM	LAKE	80						5.57	5.57			

|--|--|

Table B-1
SUMMARY STATISTICS FOR OU 3 SURFACE SEDIMENTS
COMPARISON TO BENCHMARK DATA

					1	1		Minimum	Maximum	Minimum	Maximum			
	1				_	_	Frequency of	Nondetected	Nondetected	Detected	Detected	;	Standard	Coefficient of
Chemical Name	E C	Data Source	Lake or Creek	Area	Detects	Samples	Detection	Value	Value	value	Value	Mean	Deviation	Variation
ARSENIC	mg/kg	IHSS 200	LAKE	S	36	36	1.00			2.60	9.40	4.906	1.46	0:30
ARSENIC	mg/kg	IHSS 201	LAKE	တ	43	43	1.00			1.20	17.70	6.963	4.34	0.62
ARSENIC	mg/kg	IHSS 202	LAKE	တ	1 5	15	1.00			2.20	10.40	5.147	1.96	0.38
ARSENIC	mg/kg	RMNP-BM (L. Husted)	LAKE	8								2.500	0.20	
ARSENIC	mg/kg	RMNP-BM (L. Louise)	LAKE	83								2.500	0:30	
ARSENIC	mg/kg	RMNP-BM (L. Haiyaha)	LAKE	8								8.400	0.20	
ARSENIC	mg/kg	RMNP-BM (The Loch)	LAKE	20								1.400	0.20	
BARIUM	mg/kg	вася	CREEK	80	22	57	1.00			10.60	244.00	77.910	56.38	
BARIUM	mg/kg	IHSS 200	CREEK	s	89	80	1.00			78.60	243.00	136.713	50.49	0.37
BARIUM	mg/kg		CREEK	တ	14	4	1.00			85.00	329.00	150.714	59.75	0.40
BARIUM	mg/kg	IHSS 202	CREEK	s	4	4	1.00			81.50	296.00	150.950	100.64	0.67
BARIUM	mg/kg	LOWRY	CREEK	Ð							440.00	220.640	76.59	
BARIUM	mg/kg	CC-BM	LAKE	100						591.00	591.00			
BARIUM	mg/kg	IHSS 200	LAKE	Ø	36	36	1.00			38.20	190.00	128.989	38.71	0:30
BARIUM	mg/kg	IHSS 201	LAKE	S	43	43	1.00			10.80	196.00	101.372	56.65	0.56
BARIUM	mg/kg	IHSS 202	LAKE	တ	15	15	1.00			103.00	250.00	173.000	47.92	0.28
BERYLLIUM	mg/kg	BGCR	CREEK	6	27	57	0.47			1.50	1.30	0.660	1.69	
BERYLLIUM	mg/kg	IHSS 200	CREEK	တ	80	8	1.00			0.24	1.60	0.851	0.38	0.45
BERYLLIUM	mg/kg	IHSS 201	CREEK	တ	4	14	1.00			0.22	1.50	0.577	0.31	0.54
BERYLLIUM	mg/kg	IHSS 202	CREEK	S	က	က	1.00			0.41	1.40	0.783	0.54	0.69
BERYLLIUM	mg/kg	LOWRY	CREEK	60							2.10	1.040	0.48	
BERYLLIUM	mg/kg	CC-BM	LAKE	ø						4.03	4.03			
BERYLLIUM	mg/kg	IHSS 200	LAKE	S	36	36	1.00			0.37	1.40	0.850	0.27	0.31
BERYLLIUM	mg/kg	IHSS 201	LAKE	တ	39	43	0.91	90.0	0.07	0.15	1.60	0.700	0.47	0.67
BERYLLIUM	mg/kg	IHSS 202	LAKE	တ	13	4	0.93	1.00	1.00	0.54	1.50	1.061	0.27	0.25

EG&G ROCKY FLATS	ENVIRON	EG&G ROCKY FLATS ENVIRONMENTAL TECHNOLOGY SITE	IE											
CUPTIE CONSERVAING SCREEN for Operable Unit 3	creen									Section:				Appendix B
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						F	Table B-1							
					SUMMARY S	TATISTICS F	Y STATISTICS FOR OU 3 SURFACE SE COMPARISON TO BENCHMARK DATA	SUMMARY STATISTICS FOR OU 3 SURFACE SEDIMENTS COMPARISON TO BENCHMARK DATA						
Chemical Name	je j	Data Source	Lake or Creek	Area .	Number of	Number of	Frequency of	Minimum Nondetected	Maximum Nondetected	Minimum Detected	Maximum Detected	Meen	Standard	Coefficient of
BERYLLIUM	mg/kg	RMNP-BM (L. Husted)	LAKE	В								3.900	1.00	
BERYLLIUM	mg/kg	RMNP-BM (L. Louise)	LAKE	83								5.000	3.00	
BERYLLIUM	mg/kg	RMNP-BM (L. Haiyaha)	LAKE	æ								9.300	1.10	
BERYLLIUM	mg/kg	RMNP-BM (The Loch)	LAKE	<u>m</u>								7.400	1.30	
CADMIUM	mg/kg	BGCR	CREEK	63	ø	51	0.12			0.13	1.30	0.540	0.36	
CADMIUM	mg/kg	IHSS 200	CREEK	တ	ဗ	8	0.38	0.22	0.31	0.41	1.60	0.590	0.57	96.0
CADMIUM	mg/kg	IHSS 201	CREEK	Ø	7	4	0.50	0.21	0.75	0.77	6.30	1.802	1.79	0.99
CADMIUM	mg/kg	IHSS 202	CREEK	တ		*		0.47	0.95			0.593	0.24	0.40
CADMIUM	mg/kg	LOWRY	CREEK	æ							3.80	1.040	0.99	
CADMIUM	mg/kg	CC-BM	LAKE	80						0.05	0.05			
CADMIUM	mg/kg	IHSS 200	LAKE	တ	4	36	0.39	0.20	0.45	0.58	1.70	0.568	0.43	0.76
CADMIUM	mg/kg	IHSS 201	LAKE	Ø	22	37	0.59	0.18	0.30	0.54	5.00	1.719	1.60	0.93
CADMIUM	mg/kg	IHSS 202	LAKE	Ø		80		0.35	3.95			0.986	1.22	1,23
CADMIUM	mg/kg	RMNP-BM (L. Husted)	LAKE	æ		-						0.700	0.04	
CADMIUM	mg/kg	RMNP-BM (L. Louise)	LAKE	1								0.500	0.30	
CADMIUM	mg/kg	RMNP-BM (L. Haiyaha)	LAKE	6 2								0.340	0.03	
CADMIUM	mg/kg	RMNP-BM (The Loch)	LAKE	æ								0.320	0.05	
CALCIUM	mg/kg	BGCR	CREEK	ø	85	59	0.98			93.50	17100.00	3658.240	4663.60	
CALCIUM	mg/kg	IHSS 200	CREEK	တ	60	60	1.00			1570.00	18300.00	7762.500	5522.52	0.71
CALCIUM	mg/kg	IHSS 201	CREEK	Ø	14	14	1.00			911.00	75000.00	13887.214	20983.28	1.51
CALCIUM	mg/kg	IHSS 202	CREEK	Ø	4	4	1.00			6480.00	59400.00	22077.500	25024.06	1.13
CALCIUM	mg/kg	CC-BM	LAKE	В						12.00	12.00			
CALCIUM	mg/kg	IHSS 200	LAKE	တ	36	36	1.00			3260.00	33900.00	7465.000	5909.62	0.79
CALCIUM	mg/kg	IHSS 201	LAKE	တ	\$	43	1.00			427.00	90100.00	8091.930	14021.39	1.73

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SUMMARY STATISTICS FOR OU 3 SURFACE SEDIMENTS COMPARISON TO BENCHMARK DATA

Table B-1

		Number of Fra			Number of	Number of	Frequency of	Minimum Nondetected	Maximum Nondetected	Maximum Minimum ondetected Detected	Maximum Detected		Standard	Standard Coefficient of
Chemical Name	Conft	Data Source	Lake or Creek	Area	Detects		Detection	Value	Value	value	Value	Mean		Variation
CALCIUM	mg/kg	HSS 202	LAKE	s	15	15	1.00			7050.00	42000.00	15209.333	8374.69	0.55
CALCIUM	mg/kg	RMNP-BM (L. Husted)	LAKE	80								26.000	1.00	
CALCIUM	mg/kg	RMNP-BM (L. Louise)	LAKE	8								34.100	0.10	
CALCIUM	mg/kg	RMNP-BM (L. Haiyaha)	LAKE	80								54.000	5.00	
CALCIUM	mg/kg	RMNP-BM (The Loch)	LAKE	80								47.000	6.00	
CESIUM	mg/kg	BGCR	CREEK	80	4	26	0.18				157.00	69.290	63.88	
CESIUM	mg/kg	IHSS 200	CREEK	တ		80		44.95	66.50			53.381	8.03	0.15
CESIUM	mg/kg	IHSS 201	CREEK	တ	ო	14	0.21	6.95	104.50	3.10	19.90	40.850	32.84	0.80
CESIUM	mg/kg	IHSS 202	CHEEK	တ	၈	4	0.75	126.50	126.50	1.80	2.00	33.050	62.30	1.89
CESIUM	mg/kg	IHSS 200	LAKE	တ	O	36	0.25	6.90	78.50	14.10	29.70	36.006	26.06	0.72
CESIUM	mg/kg	HSS 201	LAKE	တ		37		5.80	71.00			26.968	25.39	0.94
CESIUM	mg/kg	IHSS 202	LAKE	တ	-	6	0.11	1,25	15.75	69.80	69.80	14.744	21.57	1.46
CHROMIUM	mg/kg	вася	CREEK	m	47	29	0.80			0.48	29.70	8.130	7.42	
CHROMIUM	mg/kg	IHSS 200	CREEK	တ	9	8	0.75	0.19	0.27	2.40	12.70	4.894	4.61	0.94
CHROMIUM	mg/kg	IHSS 201	CREEK	တ	14	14	1.00			2.70	31.90	8.807	7.14	0.81
CHROMIUM	mg/kg	IHSS 202	CREEK	s	4	4	1.00			6.80	17.00	12.650	5.12	0.41
CHROMIUM	mg/kg	LOWRY	CREEK	ω							22.90	12.350	5.54	
CHROMIUM	mg/kg	HSS 200	LAKE	တ	36	36	1.00			3.70	19.80	10.947	3.79	0.35
CHROMIUM	mg/kg	IHSS 201	LAKE	တ	40	43	0.93	0.22	0.24	0.89	21.40	9.897	6.91	0.70
CHROMIUM	mg/kg	IHSS 202	LAKE	တ	4	15	0.93	4.40	4.40	5.10	22.10	14.800	5.14	0.35
COBALT	mg/kg	BGCR	CREEK	8	43	29	0.23			0:30	15.00	5.040	3.29	
COBALT	mg/kg	IHSS 200	CREEK	Ø	80	60	1.00			4.50	23.30	11,250	00'9	0.53
COBALT	mg/kg	IHSS 201	CREEK	တ	4	1	1.00			2.90	10.90	7.900	2.20	0.28
COBALT	mg/kg	HSS 202	CREEK	တ	4	4	1.00			6.30	9.60	7.825	1.36	0.17
COBALT	mg/kg	LOWRY	CREEK	œ							14.00	9.200	2.86	

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SUMMARY STATISTICS FOR OU 3 SURFACE SEDIMENTS COMPARISON TO BENCHMARK DATA Table B-1

Samples Preductive Nondetected Nondetected Nondetected Nondetected Nondetected Nondetected Nondetected Nondetected Nondetected Notice Notic						Minh		,	Minimum	Maximum	Minimum	Maximum			
Second Particle Second Par	ata Source Lake or Creek Area	ata Source Lake or Creek Area	Area		Detect	ō "	Number of Samples	Frequency of Detection	Nondetected Value	Nondetected	Detected	Detected		Standard	Coefficient of
36 1,00 3.685 5.85 4.40 13.50 8.664 2.03 43 1,00 1.30 1.320 7.049 3.53 59 0.73 5.85 5.85 4.40 15.30 8.957 2.55 14 1.00 8.90 37.50 20.225 8.20 14 1.00 1.20 18.20 1.250 8.98 4 1.00 8.10 12.30 30.233 13.27 43 1.00 8.10 12.20 30.233 13.27 43 1.00 8.10 12.20 4.857 37.57 43 1.00 8.10 12.20 48.30 17.49 64.90 5 0.39 11.65 11.16 11.16 11.10 66.10 0.385 0.058 21 0.39 11.65 11.16 11.16 0.445 0.50 0.586 0.150 59 1.00 0.500 0.800 0.800	LAKE B	LAKE B	8							- Called	ABIDA	varue	Mean	Deviation	Variation
43 1,00 1,30 1,320 1,6864 2,03 15 0,93 5,85 5,85 4,40 15,30 8,897 2,55 8 1,00 1,280 8,367 10,150 7,86 14 1,00 1,280 8,367 10,150 7,86 4 1,00 1,280 8,30 1,327 2,55 4 1,00 1,280 8,230 30,293 13,27 43 1,00 1,280 8,30 17,580 8,98 43 1,00 1,280 17,580 8,98 43 1,00 1,280 17,580 8,98 43 1,00 1,280 17,580 8,98 43 1,00 1,280 17,580 8,98 43 1,00 1,280 17,580 8,98 43 1,00 1,280 17,580 8,98 43 1,00 1,165 11,165 11,165 11,47	IHSS 200 LAKE S	LAKE S	ø	-	.,	92	36				21.30	21.30			
15 0.93 5.85 6.85 4.40 15.20 7.049 3.53 89 0.73 10.15 36.70 10.150 7.86 8.25 2.55 14 1.00 1.20 12.90 37.50 20.525 8.20 1.25 8.20 14 1.00 1.20 7.30 18.20 11.25 4.83 36 1.00 8.10 12.90 48.567 37.57 4.83 43 1.00 8.10 129.00 48.567 37.57 4.83 43 1.00 8.10 129.00 48.567 37.57 4.83 43 1.00 8.10 12.60 48.567 37.57 12.47 51 0.93 11.65 11.16 50.10 26.79 12.47 51 0.030 1.250 0.440 0.199 0.526 0.150 6 1.00 0.50 1.250 0.767 0.767 0.121 59	IHSS 201 LAKE S	LAKE S	Ø			43	43	,			4.30	13.50	8.664	2.03	0.23
59 0.73 10.15 36.70 10.150 7.86 8 1.00 12.90 37.50 20.525 8.20 14 1.00 12.90 52.30 30.293 13.27 4 1.00 7.30 18.20 17.580 8.98 36 1.00 8.10 43.40 48.30 17.580 8.98 43 1.00 8.10 43.40 48.30 17.590 8.98 43 1.00 8.10 43.40 43.40 48.30 17.54 12.47 5 0.93 11.65 11.16 11.10 50.10 26.791 64.90 12.47 2 1 0.305 11.26 11.10 50.10 26.797 12.47 12.47 5 0.305 1.250 0.445 0.400 0.199 0.150 0.150 0.150 6 1.00 0.500 0.500 0.500 0.526 0.160 0.150 8 1.00 0.500 0.90 1.443.51 5670.00 15920.00 15920.00<	mg/kg IHSS 202 LAKE S	LAKE		S		44	15		5.85	5.85	4.40	15.30	8.357	3.53	0.50
1,00	BGCR	CREEK		æ		43	ď	0.73			,	;			
14 1,00 12,90 37,50 20,525 820 4 1,00 1,00 12,90 52,30 30,293 13,27 4 1,00 7,30 18,20 11,125 4,83 43,40 43,40 43,40 48,567 37,57 43 1,00 1,260 1,260 1,260 1,260 59 1,00 1,00 1,260 1,260 1,260 6 1,00 1,00 1,00 1,000 1,000 1,000 1,000 1,000 6 1,00 1,00 1,00 1,00		CREEK		S		2 00	ς α	27.0			10.15	36.70	10.150	7.86	
4 1,000 7.30 18.20 30.239 13.27 4 1,000 7.30 18.20 11.125 4.83 43.40 43.40 11.125 4.83 43.40 48.30 17.580 8.98 43.40 43.40 48.567 37.57 43 1.00 8.10 48.567 37.57 21 0.33 0.445 11.10 50.10 26.797 12.47 21 0.305 1.250 0.440 0.189 0.169 0.150 21 0.70 0.800 0.445 0.256 0.150 0.150 6 0.600 0.90 0.560 0.360 0.150 0.150 6 1.00 0.600 0.90 0.767 0.121 0.150 8 1.00 5.00 0.300 10.400 10.300 1.2800.00 1.898.267 9 1.00 0.600 0.90 1.443.51 6.832.17 1.443.51 1.44	IHSS 201 CREEK	CREEK		ď		, 1	7	9.7			8.90	37.50	20.525	8.20	0.40
36 1.00 43.40 43.40 48.30 17.580 8.98 43 1.00 8.10 43.40 48.567 37.57 43 1.00 8.10 48.60 48.567 37.57 15 0.93 11.65 11.65 11.10 50.10 26.797 12.47 21 0.305 1.250 0.440 0.199 21 0.70 0.800 0.526 0.150 6 0.600 0.90 0.787 0.121 59 1.00 10.40.00 31400.00 25816.250 6263.19 8 1.00 5930.00 10.70 2600.00 1.21 4 1.00 50.00 25916.250 5282.17 1.21 4 1.00 44700.00 15920.000 15892.67 1.21 43 1.00 44700.00 14806.33 8712.93 1.20 43 1.00 4670.00 14806.61 1688.33 8712.93 1.20 43 1.00 1.00 14800.00 14866.51 1.20 43 1.00 1.00 1.00 1.00 1.00 44 1.00 1.00 1.00 1.00 1.00<	CREEK	CREEK		o c		* 1	•	00.1			12.90	52.30	30,293	13.27	0.44
36 1.00 8.10 48.30 17.580 8.98 43 1.00 8.10 43.40 48.567 37.57 43 1.00 8.10 48.567 37.57 15 0.93 11.65 11.16 50.10 26.797 12.47 21 0.30 0.345 0.36 6.79 0.199 0.199 21 0.30 0.445 0.382 0.058 0.150 0.199 21 0.70 0.800 0.90 0.150 0.150 0.150 6 1.00 0.600 0.90 0.140 0.199 0.150 59 1.00 0.600 0.90 1.040 0.1443.51 0.121 6 1.00 0.600 0.90 1.040.00 2591.625 0.121 59 1.00 1.00 1.0440.00 21400.00 1.291.625 1.4443.51 4 1.00 1.00 1.4443.51 1.4443.51 1.4443.51	LOWRY	CREEK) a		٠	•	00.1			7.30	18.20	11.125	4.83	0.43
36 1,00 43.40 43.40 48.567 37.57 43 1,00 11.65 11.65 11.10 60.19 64.90 15 0.93 11.65 11.16 60.10 26.797 12.47 21 0.330 0.445 0.382 0.058 21 0.305 1.250 0.440 0.199 21 0.70 0.800 0.526 0.150 6 0.600 0.90 0.767 0.121 59 1.00 8852.630 6283.19 8 1.00 570.00 25816.250 14443.51 4 1.00 570.00 25816.250 14443.51 4 1.00 49700.00 159200.00 5832.67 43700.00 23900.00 1688.333 8712.83 43 1.00 48700.00 14868.512 6832.61 4300.00 14800.00 14868.512 6832.61 4300.00 14800.00 14800.00 14800.00 <td>CC-BM LAKE</td> <td>LAKE</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>48.30</td> <td>17.580</td> <td>8.98</td> <td></td>	CC-BM LAKE	LAKE										48.30	17.580	8.98	
10	mg/kg IHSS 200 LAKE S	LAKE		o o		36	36	5			43.40	43.40			
1.20	IHSS 201 LAKE	LAKE		S		43	43	8.5			8.10	129.00	48.567	37.57	0.77
3 0.330 0.445 0.382 0.058 21 0.305 1.250 0.440 0.199 21 0.70 0.800 0.526 0.150 6 0.600 0.90 0.767 0.121 59 1.00 9430.00 51700.00 25816.250 14443.51 14 1.00 9430.00 27000.00 19200.00 5832.57 4 1.00 1400.00 14300.00 19200.00 5832.57 43 1.00 1400.00 14086.512 6885.61 15 1.00 1400.00 14086.512 6885.61	HSS 202 LAKE	LAKE		S		4	15	0.93	11.65	11.65	11.10	183.00	67.919	64.90	0.96
3 0.330 0.445 0.382 0.058 21 0.305 1.250 0.440 0.199 21 0.70 0.800 0.526 0.150 6 0.600 0.90 0.767 0.150 59 1.00 0.800 0.767 0.121 6 1.00 9430.00 25916.250 6263.19 8 1.00 5670.00 26800.00 15397.857 5222.17 4 1.00 49700.00 19200.00 5832.67 43 1.00 48700.00 1888.333 8712.93 43 1.00 48700.00 1888.333 8712.93 43 1.00 1000 14886.512 6838.61	ma/ka HAS 201	7		•			•							7	÷.
21 0.305 1.250 0.440 0.199 21 0.70 0.800 0.526 0.150 6 0.600 0.90 0.767 0.121 59 1.00 9430.00 51700.00 25916.250 144443.51 14 1.00 9430.00 25816.250 144443.51 4 1.00 14300.00 27000.00 1520.00 36 1.00 49700.00 19200.00 5832.67 43 1.00 49700.00 16888.33 8712.93 43 1.00 1.00 1.00 1.00	IHSS 201	AKF		0 0			, e		0.330	0.445			0.382	0.058	
59 1.00 0.800 0.90 0.767 0.121 59 1.00 9430.00 51700.00 25916.250 14443.51 14 1.00 8430.00 5700.00 25916.250 14443.51 4 1.00 1400.00 10200.00 15200.00 5832.67 4 1.00 49700.00 49700.00 1688.33 8712.93 43 1.00 14886.512 6885.51	IHSS 200	LAKE		o w			2 5		0.305	1.250			0.440	0.199	
59 1.00 1040.00 31400.00 8852.630 6263.19 8 1.00 9430.00 51700.00 25816.250 1443.51 14 1.00 5570.00 26600.00 15397.857 5232.17 4 1.00 14300.00 27700.00 19200.00 5832.67 36 1.00 49700.00 18868.333 8712.83 43 1.00 1.00 1.00 1.00 15 1.00 1.00 1.00 1.00	LAKE	LAKE		s			9		0.600	0.800			0.526	0.150	
100 9490.00 51700.00 25816.250 6285.19 14 1.00 9430.00 51700.00 25816.250 14443.51 14 1.00 5670.00 27000.00 15297.857 5232.17 14300.00 27000.00 19200.00 5832.67 15 1.00 4670.00 58300.00 16888.33 8712.93 16 17 17 17 17 17 17 17 17		CREEK		60		29	59	100			4040	0000			
14 1.00 59430.00 25818.250 14443.51 4 1.00 5670.00 26600.00 15397.857 5232.17 4 1.00 14300.00 27000.00 19200.00 5832.57 36 1.00 49700.00 16888.333 8712.83 43 1.00 1300.00 28300.00 14886.512 6835.61 15 1.00 1000 14886.512 68300.00 14886.512 68300.00	IHSS 200 CREEK	CREEK		S		60	9	5 5			1040.00	31400.00	8852,630	6263.19	
4 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.0	IHSS 201 CREEK	CREEK		s		4	14	8 5			9430.00	51700.00	25816.250	14443.51	0.56
36 1.00 48700.00 19200.000 5832.67 43 1.00 48700.00 28300.00 16888.333 8712.93 1000 0 28300.00 1888.512 6835.61 1000 0 1000 0 1000 0 100000 100000 100000 10000		CREEK		s		4	4	100			14300.00	26600.00	15397.857	5232.17	0.34
36 1.00 48700.00 4670.00 58900.00 1888.333 8712.93 43 1.00 3100.00 28300.00 14886.512 6835.61 15 1.00 town on town on town on the control of	CC-BM LAKE	LAKE		69				2			40700.00	27000.00	19200.000	5832.67	0:30
43 1.00 4000 1000 16888.333 8712.93 15 1.00 1000 10000 100000 14886.512 6835.61	IHSS 200	LAKE		s		36	36	6			49700.00	49700.00			
15 1.00 total and	IHSS 201 LAKE	LAKE		s		43	43	80.			46/0.00	53900.00	16888,333	8712.93	0.52
	IHSS 202 LAKE	LAKE		s		5	15	1.90			10800 00	48000 00	14805.512	6835.61	0.46

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> SUMMARY STATISTICS FOR OU 3 SURFACE SEDIMENTS COMPARISON TO BENCHMARK DATA

Table B-1

					Number of	Number of	Framiency of	Minimum	Maximum Minimum	Minimum	Maximum			
Chemical Name	Unit	Data Source	Lake or Creek	Area	Detects		Detection	Value	Value	Detected	Volue		Standard	Coefficient of
IRON	mg/kg	RMNP-BM (L. Husted)	LAKE	8					200	Adia	- and	1500,000	Deviation	Variation
HON	mg/kg	RMNP-BM (L. Louise)	LAKE	æ								000.000	40.00	
IRON	mg/kg	RMNP-BM (L. Haivaha)	LAKE	m								2400.000	100.00	
BON	mo/kg	BAAND-BAA (The Loch)	1 4/5									6200.000	900.00	
	n h	יואוואן - דואון (דואם דיספון)		۵								2300.000	300.00	
LEAD	ma/ka	BGCB	CREEK	α	02	G	•			,	;			
LEAD	ma/ka	IHSS 200	CRFFK	ď	g	60	8.5			2.10	244.00	22.020	36.79	
EAD	54/cm	Hos 204		,	• ;	0 :	00.1			5.30	36.20	18.513	9:36	0.51
0 4 1	5 1	103 501	אם היים	n	4	14	1.00			17.20	91.40	38.450	21.06	0.55
ביי	mg/kg	1028 202	CHEEK	s o	4	4	1.00			12.30	21.60	16.775	3.81	0.23
באם	mg/kg	LOWRY	CHEEK	m							380.00	28.290	66.79	
LEAD	mg/kg	CC-BM	LAKE	8						55.00	55.00			
LEAD	mg/kg	IHSS 200	LAKE	တ	36	36	1.00			13.00	00:00	04 040	9	
LEAD	mg/kg	IHSS 201	LAKE	S	43	43				00.0	347.00	21.372	10.01	0.59
LEAD	mg/kg	IHSS 202	LAKE	တ	15	15	1 00			26.2	40.00	63.747	07.11	1.05
LEAD	mg/kg	RMNP-BM (L. Husted)	LAKE	œ						4:30	40.00	78.82	6/./	0.26
LEAD	mg/kg	RMNP-BM (L. Louise)	LAKE	ω .								000		
LEAD	mg/kg	RMNP-BM (L. Haiyaha)	LAKE	60								43.000	0.00	
LEAD	ma/ka	BAAND, BAA (The Loch)	AKE	٥								26.000	2.00	
) i	2	יוואואר -כואו (דוופ בספוו)	FANE	۵								14.000	2.00	
LITHIUM	mg/kg	вася	CREEK	8	4	22	0.72			4	06 06	7 480	200	
LITHIUM	mg/kg	IHSS 200	CREEK	S	æ	80	1.00			1 80	11.50	004:1	0.50	9
LITHIUM	mg/kg	IHSS 201	CREEK	S	14	14	100			00:0	200	0.000	6.00	0.48
LITHIUM	ma/ka	HSS 202	CRFFK	ď		•	00:-			2.10	34.60	8.207	8.31	1.01
MIHL	o Now	Heese	1		• ;	* ;	90.			7.10	16.20	9.475	4.49	0.47
MOI LE	B .	1133 200	LARE	n o	36	36	1.00			3.10	17.60	8.958	3.09	0.34
WO II	mg/kg	HSS 201	LAKE	တ	45	43	0.98	0.54	0.24	0.53	17.10	7.529	4.84	0.64
LITHIUM	mg/kg	IHSS 202	LAKE	တ	4	15	0.93	7.95	7.95	7.00	13.90	11.017	2.37	0.22

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Table B-1
SUMMARY STATISTICS FOR OU 3 SURFACE SEDIMENTS
COMPARISON TO BENCHMARK DATA

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								Minimum	Maximum	Minimum	Maximum			mum
Chemical Mamo	4	9 -1-0			Number of	Number of	Number of Frequency of	Nondetected	Nondetected	Detected	Detected		Standard	Coefficient of
CHOINICAL NAME	5	Data Source	Lake or Creek	Area	Detects	Samples	Detection	Value	Value	value	Value	Mean	Deviation	Variation
MAGNESIOM	mg/kg	BGCR	CREEK	B	22	29	0.92			125.50	5850.00	1473 770	1050 57	
MAGNESIOM	mg/kg	IHSS 200	CREEK	တ	80	60	1.00			684.00	4180.00	2005 500	1232.37	
MAGNESIUM	mg/kg	IHSS 201	CREEK	co	4	14	5			00.400	4100.00	2303.300	1039.53	0.45
MAGNESIUM	ma/ka	505 SSH	CBEEK	0	: •	•	9.5			295.00	9480.00	2531.071	2234.40	0.88
MAGNESHIM	6//bm	2000 0001	21.5	0 0	* ;	4	1.00			2270.00	4460.00	2887,500	1053.58	0.36
	SV S	002 8801	LANE	'n	36	36	1.00			1280.00	5140.00	2871.667	791.80	80.0
MAGNESIOM	mg/kg	IHSS 201	LAKE	တ	43	43	1.00			197.00	6430 00	2683 449	1632 64	200
MAGNESIUM	mg/kg	IHSS 202	LAKE	တ	15	15	1.00			2480.00	5040.00	4064.000	669 17	0.0
													005.17	0.10
MANGANESE	mg/kg	BGCR	CREEK	8	28	59	86.0			0	00 000+	004		
MANGANESE	mg/kg	IHSS 200	CREEK	S	8	œ	1 00			00.0	1280.00	020.122	215.48	
MANGANESE	mg/kg	IHSS 201	CREEK	S	4	14	5			93.00	1550.00	684.000	526.56	0.77
MANGANESE	mg/kg	IHSS 202	CREEK	S	4	4	5			83.50	4450.00	1706.179	1447.03	0.85
MANGANESE	mg/kg	LOWRY	CREEK	α	•	•	2			238.00	11/0:00	548.000	423.63	0.77
MANGANESE	mg/kg	CC-BM	LAKE							0000	1560.00	605.100	281.36	
MANGANESE	mg/kg	HSS 200	LAKE	ø	36	36	5			139.00	/39.00			
MANGANESE	mg/kg	IHSS 201	LAKE	ø	. 64	43	8 5			40.50	813.00	425.914	211.90	0.50
MANGANESE	ma/ka	IHSS 202	AKE	u	4		8 9			09.60	2080.00	6/5,690	592.16	0.99
	, b			0	2	2	1.00			148.00	925.00	297.800	194.93	0.65
AERCURY	mg/kg	BGCR	CREEK	ø	8	49	0 0			2		0		
MERCURY	mg/kg	IHSS 200	CREEK	S		00		0.03	200	9	0.03	0.060	0.06	
MERCURY	mg/kg	IHSS 201	CREEK	ď	ď	, +	6	800	0.0		;	0.046	0.01	0.25
MERCURY	mg/kg	IHSS 202	CREEK	တ	•	4	7.0	0.00	90.08	0.08	0.14	0.061	0.03	0.51
MERCURY	mg/kg	LOWRY	CREEK			٠		60.0	-		,	0.045	0.04	0.89
MERCURY	mg/kg	CC-BM	LAKE	6						0	0.29	0.080	90'0	
MERCURY	mg/kg	IHSS 200	LAKE	0	4	96	•	000	0	0.06	0.06			
MERCURY	mg/kg	HSS 201	LAKE	o co	, L	8 \$	5 6	0.03	0.08	0.10	0.20	0.063	0.03	0.51
MERCURY	ma/ka	HSS 202	IAKE	0	•	ă c	6.43	0.00	0.10	0.08	0.60	0.116	0.12	1.06
MERCURY	mo/kg	RMNP-RM // History	- אגם	,	-	0	0.13	0.04	0.23	0.10	0.10	0.081	90.0	0.77
MERCURY	ma/ka	RMNP-BM (L. Louise)	AKF	0 0								0.030	0.01	
MERCURY	ma/ka	BMNP-RM (L Haivaha)	I AKE	۵ ۵								0.065	0.01	
	6	(manufactural) international		2								0.050	0.00	

Section: Section: Page: Non-Controlled Document Table B-1 SUMMARY STATISTICS FOR OU 3 SURFACE SEDIMENTS

					Number of	Number of	Frequency of	Minimum Nondetected	Maximum Nondetected	Minimum Detected	Maximum Detected		Standard	Coefficient
Chemical Name	Onit	Data Source	Lake or Creek	Area			Detection	Value	Value	value	Value	Mean	Devlation	Variation
MERCURY	mg/kg	RMNP-BM (The Loch)	LAKE	8								0.040	0.01	
MOLYBDENUM	mg/kg	BGCR	CREEK	20	91	58	0.28			0.33	9.60	4.470	5.23	
MOLYBDENUM	mg/kg	IHSS 200	CREEK	တ	9	80	0.75	0.80	0.80	3.60	17.90	7.838	6.30	0.80
MOLYBDENUM	mg/kg	IHSS 201	CREEK	တ	9	14	0.43	0.35	2.30	1.60	6.70	2.379	1.87	0.78
MOLYBDENUM	mg/kg	HSS 202	CREEK	တ		4		1.80	2.10			1.900	0.14	0.07
MOLYBDENUM	mg/kg	CC-BM	LAKE	m						22.00	22.00			
_	mg/kg	IHSS 200	LAKE	တ	23	36	0.64	0.24	0.85	0.58	13.30	3.077	3.47	1.13
	mg/kg	IHSS 201	LAKE	တ	20	37	0.54	0.20	1.25	0.69	7.70	1.910	2.17	1.14
MOLYBDENUM	mg/kg	IHSS 202	LAKE	Ø		æ		0.42	15.40			3.389	5.02	1.48
NICKEL	mg/kg	BGCR	CREEK	Ω	36	57	99'0			0.65	25.60	6.750	r,	
NICKEL	mg/kg	IHSS 200	CREEK	တ	80	8	1.00			10.00	72.70	25.200	20.31	0.81
NICKEL	mg/kg	IHSS 201	CREEK	ഗ	13	4-	0.93	3.15	3.15	8.60	22.60	14.811	5,53	0.37
NICKEL	mg/kg	IHSS 202	CREEK	တ	e	4	0.75	3.55	3.55	14.90	16.90	12.588	60.9	0.48
NICKEL	mg/kg	LOWRY	CREEK	œ							131.00	15.450	22.29	
NICKEL	mg/kg	CC-BM	LAKE	Ф						26.20	26.20			
NICKEL	mg/kg	IHSS 200	LAKE	တ	36	36	1.00			5.70	22.70	15.725	3.96	0.25
NICKEL	mg/kg	IHSS 201	LAKE	S	40	43	0.93	1.20	1.35	3.40	23.70	12.338	6.64	0.54
NICKEL	mg/kg	HSS 202	LAKE	s	12	15	0.80	4.85	29.90	10.50	29.20	17.087	6.70	0.39
NICKEL	mg/kg	RMNP-BM (L. Husted)	LAKE	80								9.600	0.20	
NICKEL	mg/kg	RMNP-BM (L. Louise)	LAKE	8								10.000	0.00	
NICKEL	mg/kg	RMNP-BM (L. Haiyaha)	LAKE	æ								12.300	0.60	
NICKEL	mg/kg	RMNP-BM (The Loch)	LAKE	80								18.000	2.00	
POTASSIUM	mg/kg	вася	CREEK	B	43	58	0.24			57.00	3770.00	835.340	749.42	
POTASSIUM	mg/kg	IHSS 200	CREEK	တ	80	80	1.00			548.00	2090.00	1210.375	579.40	0.48
POTASSIUM	mg/kg	IHSS 201	CREEK	တ	41	14	1,00			549.00	8390.00	1794.857	1993.05	1.1

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SUMMARY STATISTICS FOR OU 3 SURFACE SEDIMENTS COMPARISON TO BENCHMARK DATA

Table B-1

								Minimum	Maximum	Minimum	Maximum			
					Number of	Number of	Frequency of	Nondetected	Nondetected	Detected	Detected		Standard	Coefficient of
Chemical Name	들	Data Source	Lake or Creek	Area	Detects	Samples	Detection	Value	Value	value	Value	Mean	Deviation	Variation
POTASSIUM	mg/kg	IHSS 202	CREEK	s	4	4	1.00			1210.00	2760.00	1745.000	691.40	0.40
POTASSIUM	mg/kg	CC-BM	LAKE	æ						15100.00	15100.00			
POTASSIUM	mg/kg	IHSS 200	LAKE	တ	36	36	1.00			402.00	2700.00	1573.750	598.93	0.38
POTASSIUM	mg/kg	IHSS 201	LAKE	တ	43	43	1.00			183.00	3630.00	1734.512	1138.91	0.66
POTASSIUM	mg/kg	IHSS 202	LAKE	တ	4	ŧ	0.93	2755.00	2755.00	1370.00	3450.00	2777.000	639.00	0.23
SELENIUM	mg/kg	BGCR	CREEK	m	13	58	0.22			0.10	2.90	0.420		
SELENIUM	mg/kg	IHSS 200	CREEK	တ	9	80	0.75	0.11	0.11	0.44	0.77	0.487	0.26	0.53
SELENIUM	mg/kg	IHSS 201	CREEK	S	ဇ	4	0.21	0.10	09'0	1,50	2.20	0.598	0.74	1.24
SELENIUM	mg/kg	IHSS 202	CREEK	S		4		0.11	0.28			0.190	0.07	0.36
SELENIUM	mg/kg	CC-BM	LAKE	6 0						1.10	1.10			
SELENIUM	mg/kg	IHSS 200	LAKE	S	13	22	0.59	0.10	1.10	0.24	4.00	0.888	1.04	1.17
SELENIUM	mg/kg	IHSS 201	LAKE	s	on.	32	0.28	0.10	3.55	0.18	4.50	0.892	1.02	1.15
SELENIUM	mg/kg	IHSS 202	LAKE	တ	၈	=	0.27	0.15	1.60	1.90	5.70	1.723	2.00	1.16
SELENIUM	mg/kg	RMNP-BM (L. Husted)	LAKE	100								1.800	0.10	
SELENIUM	mg/kg	RMNP-BM (L. Louise)	LAKE	8								1.200	0.10	
SELENIUM	mg/kg	RMNP-BM (L. Haiyaha)	LAKE	æ								1.800	0.40	
SELENIUM	mg/kg	RMNP-BM (The Loch)	LAKE	6 0								1.100	0:30	
SILICON	ma/ka	BGCR	CREEK	æ	19	19	1.00				1450.00	331.530	362.31	
SILICON	mg/kg	IHSS 200	CREEK	တ	80	80				128.00	1020.00	459.125	365.62	0.80
SILICON	mg/kg	IHSS 201	CREEK	s	æ	œ				281.00	3290.00	1167.500	937.25	0.80
SILICON	mg/kg	IHSS 202	CREEK	တ	-	-	1.00			412.00	412.00	412.000		
SILICON	mg/kg	IHSS 200	LAKE	တ	15	15				115.00	650.00	237.667	125.31	0.53
SILICON	mg/kg	IHSS 201	LAKE	တ	13	55	1.00			82.00	396.00	197.308	79.13	0.40
SILVER	ma/ka	BGCR	CREEK	6 0	8	54	0.04			0.20	3.40	0.660	0.52	
SILVER	mg/kg	IHSS 200	CREEK	တ	^	80		0.26	0.26	1.20	4.00	2,382	1.35	0.57

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SUMMARY STATISTICS FOR OU 3 SURFACE SEDIMENTS COMPARISON TO BENCHMARK DATA

Table B-1

Challes of the control of th									Minimum	Maximum	Minimum	Maximum			
1001 Dist Source Lake of Creek Area Detection Value Value<								Frequency of	Nondetected	Nondetected	Detected	Detected		Standard	Coefficient of
mgkg HSS 201 CREEK S 14 6.57 0.26 0.75	Chemical Name	Ş		Lake or Creek	Area	Detects	Samples	Detection	Value	Value	value	Value	Mean	Deviation	Variation
mgkg HSS 2012 CREK S 1 A Q25 G43 150 150 0.78 D79 D79 </td <td>SILVER</td> <td>mg/kg</td> <td>IHSS 201</td> <td>CREEK</td> <td>S</td> <td>8</td> <td>14</td> <td>0.57</td> <td>0.25</td> <td>0.75</td> <td>0.79</td> <td>2.10</td> <td>0.942</td> <td>0.58</td> <td>0.62</td>	SILVER	mg/kg	IHSS 201	CREEK	S	8	14	0.57	0.25	0.75	0.79	2.10	0.942	0.58	0.62
mg/kg CC-BM LAKE B AR AR B AR AR AR B AR AR </td <td>SILVER</td> <td>mg/kg</td> <td>IHSS 202</td> <td>CREEK</td> <td>S</td> <td>-</td> <td>4</td> <td>0.25</td> <td>0.43</td> <td>0.43</td> <td>1.90</td> <td>1.90</td> <td>0.796</td> <td>0.74</td> <td>0.92</td>	SILVER	mg/kg	IHSS 202	CREEK	S	-	4	0.25	0.43	0.43	1.90	1.90	0.796	0.74	0.92
mg/kg HSS 200 LAKE S 28 36 0.78 0.28 0.89 0.79 1.10 6.00 1917 113 mg/kg HSS 201 LAKE S 31 35 0.89 0.23 0.50 0.46 1.70 1.10 mg/kg HSS 201 CARE S 47 69 0.80 3.60 1.50 1.70 1.97 1.10 mg/kg HSS 201 CREEK S 4 1.00 6.00 67.00 161.470 0.89 mg/kg HSS 201 CREEK S 4 1.00 5.00 5.00 68.00 1.61.70 1.70 mg/kg HSS 201 CREEK S 4 1.00 7.70 1.60.00 1.61.70 1.60.00 1.61.71 1.70 1.60.00 1.61.71 1.70 1.60.00 1.61.71 1.70 1.60.00 1.61.71 1.70 1.60.00 1.61.71 1.70 1.60.00 1.60.00 1.60.00	SILVER	mg/kg	CC-BM	LAKE	ø						0.05	0.05			
mg/kg H/85 201 LAKE 8 31 35 0.89 0.25 0.46 7.70 1.995 1.77 1.77 1.995 1.77 1.77 1.995 1.77 1.77 1.995 1.77 1.77 1.995 1.77 1.77 1.70 1.70 1.70 1.70 1.70 1.70 1.70 1.70 1.70 1.70 1.70 1.70 1.70 1.70	SILVER	mg/kg	IHSS 200	LAKE	တ	58	36	0.78	0.26	0.95	1.10	6.00	1.917	1.13	0.59
mg/kg HSS 202 CAREK S 47 59 0.80 3.60 1.50 1.90 1.40 0.99 mg/kg HSS 202 CREEK S 47 59 0.80 0.80 57.70 2490.00 595.88 811.75 mg/kg HSS 202 CREEK S 44 1.00 57.70 2490.00 595.88 811.75 mg/kg HSS 202 CREEK S 44 1.00 7.70 2490.00 595.88 811.75 mg/kg HSS 202 CAREK S 44 1.00 7.70 2490.00 595.88 811.71 mg/kg HSS 202 CAREK S 43 1.00 7.70 43.00 187.71 412.13 mg/kg HSS 202 LAKE S 43 1.00 7.70 420.00 595.89 811.71 mg/kg HSS 202 LAKE S 43 1.00 7.70 420.00 595.89 811.71	SILVER	mg/kg	IHSS 201	LAKE	တ	31	35	0.89	0.23	0.50	0.48	7.70	1.995	1.77	0.89
mgkg BBGCR CREEK 8 47 69 0.80 182.00 637.00 161.470 136.80 mgkg HSS 200 CREEK 8 8 1,00 57.70 2490.00 535.68 811.75 mgkg HSS 201 CREEK 8 14 1,00 51.50 1610.00 286.00 533.00 249.50 421.31 41.75 mgkg HSS 202 CREEK 8 43 1,00 43.00 161.00 161.70 161.71 42.10 161.71 42.10 161.71 42.10 42.10 42.10 42.11 42	SILVER	mg/kg	IHS\$ 202	LAKE	တ	63	8	0.25	0.60	3.60	1.50	1.90	1.400	0.99	0.71
mg/kg H/SS 200 CREEK S 4 1,00 57.70 2490,00 555.68B 811.75 mg/kg H/SS 201 CREEK S 14 14 1,00 51.50 1610,00 268.107 412.13 mg/kg H/SS 201 LAKE S 36 1,00 820.00 284.20 442.20 887.00 288.30 417.11 mg/kg H/SS 201 LAKE S 36 1,00 820.00 580.00 188.735 96.31 167.11 UM mg/kg H/SS 201 CREEK S 1,00 820.00 188.735 96.31 10.39 UM mg/kg H/SS 201 CREEK S 14 1,00 91.00 97.00 188.735 96.31 10.39 UM mg/kg H/SS 201 CREEK S 14 1,00 91.00 97.00 67.89 81.12 UM mg/kg H/SS 201 CREEK S 14 1,00	SODIUM	mg/kg	вася	CREEK	æ	47	29	0.80			162.00	637.00	161.470	136.80	
mg/kg HSS 201 CREEK S 4 14 1.00 51.50 161.00 266.107 412.13 mg/kg HSS 202 CREEK S 4 4 1.00 193.00 286.00 286.107 412.11 mg/kg HSS 202 CREEK S 4 4 1.00 180.00 286.00 161.71 mg/kg HSS 201 LAKE S 43 1.00 26.00 286.30 281.50 161.71 UM mg/kg HSS 201 CREEK S 4 1.00 1.00 180.00 286.30 281.50 161.71 UM mg/kg HSS 202 CREEK S 4 1.00 1.00 180.00 89.33 210.39 UM mg/kg HSS 201 CREEK S 4 1.00 1.00 82.00 181.25 UM mg/kg HSS 201 LAKE S 4 1.00 82.00 17.15 17.15 <td>MUIGOS</td> <td>mg/kg</td> <td>IHSS 200</td> <td>CREEK</td> <td>တ</td> <td>80</td> <td>60</td> <td>1.00</td> <td></td> <td></td> <td>57.70</td> <td>2490.00</td> <td>535,588</td> <td>811.75</td> <td>1.52</td>	MUIGOS	mg/kg	IHSS 200	CREEK	တ	80	60	1.00			57.70	2490.00	535,588	811.75	1.52
mg/kg HSS 202 CREEK S 4 1 00 193 00 533 00 291 500 161 71 mg/kg HSS 200 LAKE S 43 1 00 43.20 997 00 284.39 240.31 mg/kg HSS 201 LAKE S 43 1 00 68.00 1 00 997 00 284.39 240.31 UM mg/kg HSS 202 LAKE S 15 1 00 100 987 00 58.838 240.31 UM mg/kg HSS 202 CREEK S 1 5 1,00 100 91.30 58.375 27.23 UM mg/kg HSS 202 CREEK S 4 1,00 100 91.30 58.375 27.23 UM mg/kg HSS 202 CREEK S 4 1,00 202.00 57.828 24.19 UM mg/kg HSS 202 LAKE S 4 1,00 2.80 48.12 62.11 <td< td=""><td>MOIDOS</td><td>mg/kg</td><td>IHSS 201</td><td>CREEK</td><td>တ</td><td>4</td><td>41</td><td>1.00</td><td></td><td></td><td>51.50</td><td>1610.00</td><td>286.107</td><td>412.13</td><td>1,44</td></td<>	MOIDOS	mg/kg	IHSS 201	CREEK	တ	4	41	1.00			51.50	1610.00	286.107	412.13	1,44
mg/kg HSS 200 LAKE S 36 100 43.20 997.00 268.389 240.31 mg/kg HSS 201 LAKE S 43 1.00 26.00 509.00 138.735 96.31 UM mg/kg HSS 202 LAKE S 43 1.00 171.00 1080.00 369.333 210.39 UM mg/kg HSS 202 CREEK S 48 58 1.00 421.00 369.33 210.39 UM mg/kg HSS 201 CREEK S 4 1.00 183.0 227.00 67.286 61.12 UM mg/kg HSS 201 CREEK S 4 4 1.00 35.80 349.00 131.225 147.15 UM mg/kg HSS 201 LAKE S 4 4 1.00 35.80 349.00 131.225 147.15 UM mg/kg HSS 201 LAKE S 4 4 1.00	SODIUM	mg/kg	IHSS 202	CREEK	Ø	4	4	1,00			193.00	533.00	291,500	161.71	0.55
mg/kg HSS 201 LAKE S 43 43 1.00 26.00 509.00 138.735 96.81 mg/kg HSS 202 LAKE S 48 56 1.00 171.00 1080.00 36.339 210.39 UM mg/kg HSS 202 CREEK S 4 4 1.00 421.00 36.380 59.87 UM mg/kg HSS 200 CREEK S 4 4 1.00 15.00 91.30 55.375 27.23 UM mg/kg HSS 201 CREEK S 4 4 1.00 36.80 349.00 131.225 147.15 UM mg/kg HSS 202 LAKE S 4 4 1.00 36.80 349.00 131.225 147.15 UM mg/kg HSS 201 LAKE S 4 4 1.00 202.00 202.00 202.00 202.00 202.00 202.00 202.00 202.00 202.00	SODIUM	mg/kg		LAKE	Ø	36	36	1,00			43.20	997.00	268.389	240.31	06'0
UM mg/kg HSS 202 LAKE S 15 10 171.00 171.00 170.00 369.333 210.39 UM mg/kg HSS 202 CREEK S 4 1,00 421.00 36.380 59.87 UM mg/kg HSS 201 CREEK S 14 1,00 15.00 91.30 55.375 27.23 UM mg/kg HSS 201 CREEK S 14 1,00 16.00 91.30 55.375 27.23 UM mg/kg HSS 201 LAKE S 4 1,00 20.00 227.00 67.286 61.12 UM mg/kg HSS 201 LAKE S 43 1,00 20.00 423.00 43.10 57.828 71.15 UM mg/kg HSS 201 LAKE S 43 1,00 20.00 423.00 421.00 57.828 71.15 UM mg/kg HSS 201 LAKE S 43 <t< td=""><td>SODIUM</td><td>mg/kg</td><td></td><td>LAKE</td><td>တ</td><td>43</td><td>43</td><td>1.00</td><td></td><td></td><td>26.00</td><td>509.00</td><td>138,735</td><td>96.81</td><td>0.70</td></t<>	SODIUM	mg/kg		LAKE	တ	43	43	1.00			26.00	509.00	138,735	96.81	0.70
mg/kg BGCR CREEK 8 48 58 0.633 2.80 421.00 36.380 59.87 27.23 mg/kg HSS 200 CREEK S 14 14 1.00 15.00 91.30 55.375 27.23 mg/kg HSS 201 CREEK S 4 4 1.00 34.90 131.225 147.15 mg/kg C-BM LAKE S 36 1.00 202.00 202.00 202.00 147.15 147.15 mg/kg HSS 201 LAKE S 43 4.00 57.828 24.19 25.01 mg/kg HSS 202 LAKE S 15 1.00 47.10 190.00 82.813 32.39 mg/kg HSS 202 CREEK S 15 1.00 47.10 190.00 82.813 32.39 mg/kg HSS 200 CREEK S 50 0.04 47.10 190.00 82.813 32.39 mg/kg	SODIUM	mg/kg		LAKE	တ	5	15	1.00			171.00	1080.00	369.333	210.39	0.57
mg/kg BGCH CREEK B 48 56 0.83 2.80 421.00 50.50 20.50			1		ı	;	į	0			6	50,00	000	6	
mg/kg HSS 200 CREEK S 6 1.00 91.30 55.375 27.23 mg/kg HSS 201 CREEK S 14 14 1.00 18.30 227.00 67.286 61.12 mg/kg HSS 202 CREEK S 4 1.00 35.80 349.00 13.225 147.15 mg/kg HSS 202 LAKE B 36 1.00 202.00 202.00 57.828 24.19 mg/kg HSS 201 LAKE S 43 1.00 2.80 423.00 49.812 62.01 mg/kg HSS 202 CREEK B 2 50 0.04 0.16 0.23 0.23 mg/kg HSS 200 CREEK B 2 50 0.04 0.16 0.23 0.19 0.02	STRONTIUM	mg/kg	BGCR	CREEK	œ	48	28	0.83			2.80	421.00	36.380		
mg/kg HSS 201 CREEK S 14 14 1.00 18.30 227.00 67.286 61.12 mg/kg HSS 202 CCHEK S 4 4 1.00 35.80 349.00 131.225 147.15 mg/kg HSS 202 CC-BM LAKE S 36 1.00 202.00 202.00 57.828 24.19 mg/kg HSS 201 LAKE S 15 1.00 47.10 190.00 82.813 32.39 mg/kg HSS 200 CREEK B 2 50 0.04 0.16 0.23 0.90 0.23	STRONTIUM	mg/kg	IHSS 200	CREEK	S	89	ec	1.00			15.00	91.30	55.375		0.49
mg/kg IHSS 202 CREEK S 4 4 1.00 35.80 349.00 131.25 147.15 mg/kg IHSS 202 LAKE B 36 1.00 202.00 202.00 mg/kg HSS 201 LAKE S 43 43 1.00 2.80 423.00 49.812 62.01 mg/kg HSS 202 LAKE S 15 15 1.00 47.10 190.00 82.813 32.39 mg/kg HSS 200 CREEK B 2 50 0.04 0.16 0.23 0.19 0.023	STRONTIUM	mg/kg	IHSS 201	CREEK	တ	14	14	1.00			18.30	227.00	67.286		0.91
mg/kg CC-BM LAKE B 36 1.00 202.00 <t< td=""><td>STRONTIUM</td><td>mg/kg</td><td>HSS 202</td><td>CREEK</td><td>s</td><td>4</td><td>4</td><td>1.00</td><td></td><td></td><td>35.80</td><td>349.00</td><td>131.225</td><td>147.15</td><td>1.12</td></t<>	STRONTIUM	mg/kg	HSS 202	CREEK	s	4	4	1.00			35.80	349.00	131.225	147.15	1.12
mg/kg HSS 200 LAKE S 36 1.00 26.70 154.00 57.828 24.19 1.00 185.201 185.201 1.00 2.80 423.00 49.812 62.01 1.00	STRONTIUM	mg/kg	CC-BM	LAKE	æ						202.00	202.00			
mg/kg HSS 201 LAKE S 43 43 1.00 2.80 423.00 49.812 62.01 mg/kg HSS 202 LAKE S 15 15 1.00 47.10 190.00 82.813 32.39 mg/kg BGCR CREEK B 2 50 0.04 0.40 0.300 0.23 mg/kg HSS 200 CREEK S 8 0.16 0.23 0.199 0.02	STRONTIUM	mg/kg	HSS 200	LAKE	တ	36	36	1.00			26.70	154.00	57.828		0.42
mg/kg HSS 202 LAKE S 15 15 1.00 47.10 190.00 82.813 32.39 mg/kg BGCR CREEK B 2 50 0.04 0.40 0.300 0.23 mg/kg HSS 200 CREEK S 8 0.16 0.23 0.199 0.02	STRONTIUM	mg/kg	IHSS 201	LAKE	တ	43	43	1.00			2.80	423.00	49.812	62.01	1.24
mg/kg BGCR CREEK B 2 50 0.04 0.40 0.300 0.23 mg/kg IHSS 200 CREEK S 8 0.16 0.23 0.199 0.02	STRONTIUM	mg/kg		LAKE	s	15	15	1.00			47.10	190.00	82.813	32.39	0.39
mg/kg HSS 200 CREEK S 8 0.16 0.23 0.199 0.02	THALLIUM	ma/ka		CREEK	ω.	8	50	0.04				0.40	0.300		
	THALLIUM	ma/ka		CREEK	တ		8		0.16				0.199		0.12

Appendix B 12 of 40 0.63 0.66 0.66 0.83 Coefficient of Variation 0.42 0.69 0.18 0.66 0.73 0.84 0.67 0.47 0.26 0.42 6.09 0.59 1.13 2.02 1.30 1.30 1.30 0.15 0.26 0.40 0.48 14.30 22.62 12.11 9.70 11.66 13.49 12.17 21.53 0.10 6.00 6.00 Standard Deviation 0.223 0.398 0.481 0.656 2.781 6.250 13.670 1.964 3.192 22.968 18.330 33.913 26.029 37.400 33.310 31.839 24.300 42.987 27.300 35.000 55.000 6.10 10.40 51.40 73.00 87.70 60.90 51.10 72.90 70.70 50.00 114.00 0.38 0.25 0.95 Maximum Detected 2.00 16.10 11.20 28.70 0.28 2.60 115.00 9.10 Minimum Detected Section: Page: 0.75 0.43 1.30 1.95 4.05 5.75 58.00 1.95 8.70 6.95 Maximum Nondetected SUMMARY STATISTICS FOR OU 3 SURFACE SEDIMENTS COMPARISON TO BENCHMARK DATA 0.11 0.18 0.23 0.15 0.85 1.30 4.95 0.80 Minimum Nondetected Number of Frequency of Samples Detection 0.14 0.25 0.03 0.21 0.56 0.45 0.93 1.00 1.00 0.30 8 8 8 Table B-1 57 8 14 4 4 36 38 8 4 4 E E 38 36 43 Number of Detects 9 ις α 1 4 20 2 36 43 Area 9 9 9 9 9 **_** Lake or Creek LAKE LAKE LAKE ZKE RMNP-BM (L. Husted) RMNP-BM (L. Louise) RMNP-BM (L. Haiyaha) Data Source HSS 201 HSS 202 HSS 200 HSS 201 HSS 201 HSS 202 HSS 200 HSS 201 HSS 202 IHSS 200 IHSS 201 IHSS 202 HSS 200 IHSS 201 HSS 202 IHSS 200 LOWRY HSS 201 LOWRY CC-BM BGCR BGCR ž mg/kg mg/kg mg/kg mg/kg Non-Controlled Document Chemical Name VANADIUM THALLIUM THALLIUM THALLIUM THALLIUM THALLIUM

ANADIUM

EG&G ROCKY FLATS ENVIF CDPHE Conservative Screen for Operable Unit 3	Screen	EG&G ROCKY FLATS ENVIRONMENTAL TECHNOLOGY SITE CDPHE Conservative Screen for Operable Unit 3	SITE							Section:				Appendix B
Non-Controlled Document	nent									rage:				13 of 40
						1	Table B-1							
					SUMMARY	STATISTICS F	Y STATISTICS FOR OU 3 SURFACE SEI COMPARISON TO BENCHMARK DATA	SUMMARY STATISTICS FOR OU 3 SURFACE SEDIMENTS COMPARISON TO BENCHIMARK DATA						
Amely legiments	1	o sted	Acces On the		Number of	Number of	Frequency of	Minimum Nondetected	Maximum Nondetected	Minimum Detected	Maximum Detected		Standard	Coefficient of
VANADIUM	mg/kg	RMNP	LAKE	В		Sallings	Discount	Agine	Agina	Attine	en a	43.000	3.00	Variation
ZINC	mg/kg	BGCR	CREEK	62	55	58.00	0.95			3.25	155.00	43.770	30.23	
ZINC	mg/kg	IHSS 200	CREEK	s	80	60	1.00			46.70	460.00	149.113	134.24	0.90
ZINC	mg/kg	IHSS 201	CREEK	တ	14	41				53.00	1170.00	422.243	384.51	0.91
ZINC	mg/kg	IHSS 202	CREEK	တ	4	4				44.60	56.60	49.475	5.31	0.11
ZINC	mg/kg	LOWRY	CREEK	6							726.00	76.750	124.61	
ZINC	mg/kg	CC-BM	LAKE	æ						158.00	158.00			
ZINC	mg/kg	HSS 200	LAKE	တ	36	36	1,00			28.50	540.00	195.339	145.76	0.75
ZINC	mg/kg	IHSS 201	LAKE	တ	43	43	1.00			9.00	1120.00	425.593	392.51	0.92
ZINC	mg/kg	IHSS 202	LAKE	တ	15	15	1.00			40.50	193.00	81.247	34.67	0.43
ZINC	mg/kg	RMNP-BM (L. Husted)	LAKE	Δ								117.000	2.00	
ZINC	mg/kg	RMNP-BM (L. Louise)	LAKE	8								125.000	3.00	
ZINC	mg/kg	RMNP-BM (L. Haiyaha)	LAKE	æ								72.000	4.00	
ZINC	mg/kg	RMNP-BM (The Loch)	LAKE	8								95.000	9.00	
RADIONUCLIDES						(4)								
AMERICIUM-241	pCi/g	BGCR	CREEK	20	59	59	1.00			-0.01	0.82	0.070	0.19	
AMERICIUM-241	pCi/g	IHSS 200	CREEK	Ø	S	ស	1.00			00:00	90.0	0.017	0.05	1.43
AMERICIUM-241	pCi/g	IHSS 201	CREEK	တ	13	13	1.00			00:00	0.08	0.022	0.03	1.19
AMERICIUM-241	pCi/g	IHSS 202	CREEK	Ø	4	4	1.00			0.02	0.05	0.030	0.01	0.39
AMERICIUM-241	pCi/g	IHSS 200	LAKE	S	34	34	1.00			0.01	0.21	0.043	0.05	1.20
AMERICIUM-241	pCi/g	IHSS 201	LAKE	S	39	39	1.00			00'0	0.11	0.017	0.05	1.36
AMERICIUM-241	pCi/g	IHSS 202	LAKE	တ	15	15	1.00			0.01	0.09	0.049	0.03	0.52
CESIUM-136	pCI/g	вася	CREEK	82							1.50	0.260		

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Table B-1 SUMMARY STATISTICS FOR OU 3 SURFACE SEDIMENTS COMPARISON TO BENCHMARK DATA

								Minimum	Maximum	Minimum	Maximum			
					Number of	_	Frequency of	Nondetected	Nondetected	Detected	Detected		Standard	Coefficient of
Chemical Name	ž	Data Source	Lake or Creek	Area	Detects	Samples	Detection	Value	Value	value	Value	Mean	Deviation	Variation
CESIUM-137	bCl∕g	IHSS 200	CREEK	တ	9	9	1.00			0.05	0.57	0.179	0.21	1.15
CESIUM-137	pCi/g	IHSS 200	LAKE	s	14	4	1.00			0.03	0.19	0.080	0.05	0.66
CESIUM-137	bCl/g	IHSS 201	LAKE	တ		8						0.048	0.00	0.10
GROSS ALPHA	bCi/d	BGCR	CREEK	æ	45	45	1,00			2.92	72.00	22 980	0.38	
GROSS ALPHA	bCl/g	NHSS 200	CREEK	တ	80	æ	1.00			15.00	28.00	19.849	4.49	0.23
GROSS ALPHA	pCi/g	IHSS 201	CREEK	Ø	14	4	1.00			8.30	33.00	18,513	99.9	0.36
GROSS ALPHA	pCi/g	IHSS 202	CREEK	s	4	4	1.00			17.00	43.00	25.900	12.12	0.47
GROSS ALPHA	pCI/g	IHSS 200	LAKE	တ	34	34	1.00			3.80	37.00	24,269	7.74	0.32
GROSS ALPHA	pCI/g	IHSS 201	LAKE	တ	45	42	1.00			4.40	39.00	19.034	7.81	0.41
GROSS ALPHA	pCi/g	IHSS 202	LAKE	တ	15	15	1.00			15.13	84.00	32.578	17.61	0.54
GBOSS BETA	Ş	acca	20000	a	Ş	\$	5				9	040	97.00	
GDOGG BETA		1000	Control	3 6	} •	P	90:-			00	09:00	33.330	20.40	
GHOSS BEILY	ر ا ا	1100 200	משנים ו	0	•	• :	9.			20.00	37.56	26,839	5.83	0.22
GROSS BETA	bCi/g	HSS 201	CREEK	တ	14	4	1.00			17.00	36.00	27.541	4.48	0.16
GROSS BETA	pCi/g	IHSS 202	CREEK	တ	4	4	1.00			20.00	31.00	23.250	5.25	0.23
GROSS BETA	pCi/g	IHSS 200	LAKE	S	34	34	1.00			9.20	37.50	25.050	4.93	0.20
GROSS BETA	pCi/g	IHSS 201	LAKE	s	42	45	1.00			8.80	56.61	25,961	8.69	0.33
GROSS BETA	pCi/g	IHSS 202	LAKE	တ	15	15	1.00			27.00	53.00	32,987	6.70	0.20
PLUTONIUM-239/240	pCi/g	BGCR	CREEK	æ	42	42	1.00			0.00	2.36	0.170	0.59	
PLUTONIUM-239/240	pCi/g	IHSS 200	CREEK	S	60	œ	1.00			0.00	0.55	0.156	0.20	1.29
PLUTONIUM-239/240	pCi/g	IHSS 201	CREEK	တ	4	14	1.00			-0.01	0.47	0.082	0.16	1.97
PLUTONIUM-239/240	pCi/g	IHSS 202	CREEK	တ	4	4	1.00			0.05	0.17	0.091	90.0	09:0
PLUTONIUM-239/240	pCi/g	BGCR	LAKE	m						0.02	0.13	0.130		
PLUTONIUM-239/240	pCi/g	IHSS 200	LAKE	တ	87	87	1.00			00'0	3.30	0.267	0.59	2.23

EG&G ROCKY FLATS ENVIRONMENTAL TECHNOLOGY SITE	CDPHE Conservative Screen	for Operable Unit 3
EG&G ROCK	CDPHE Cons	for Operable t

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SUMMARY STATISTICS FOR OU 3 SURFACE SEDIMENTS COMPARISON TO BENCHMARK DATA

Table B-1

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Section: Page:

								Minimum	Maximum	Minimum Maximum	Maximum			
					Number of	Number of	Number of Frequency of	Nondetected	Nondetected	Detected	Detected		Standard	Coefficient of
Chemical Name	a S	Data Source	Lake or Creek	Area	Detects	Samples	Detection	Value	Value	vafue	Value	Mean	Deviation	Variation
PLUTONIUM-239/240	pCl/g	IHSS 201	LAKE	S	105	105	1.00			-0.02	0.55	0.033	90.0	1.81
PLUTONIUM-239/240	pCi/g	IHSS 202	LAKE	Ø	15	15	1.00			0.03	0.49	0.291	0.16	0.57
900 449 900	Į,	a	CBEEK	α	6		Ę			0.43	1.80	0.850	98.0	
RADIIM-226		HSS 500	CRFFK	o co	9	; °C	1.00			0.85	1.20	1.067	0.15	0.14
RADIUM-226	, b)Od	IHSS 200	LAKE	S	, 1	14	1.00			0.84	2.20	1.124	0.34	0:30
RADIUM-226	bCi/g	HSS 201	LAKE	Ø	8	80	1.00			0.28	1.40	0.790	0.35	0.44
RADIUM-228	pCi/g	IHSS 200	CREEK	Ø	9	9	1.00			0.97	1.70	1.328	0.23	0.18
RADIUM-228	pCl/g	IHSS 200	LAKE	တ	14	41	1.00			0.92	2.20	1.444	0.37	0.26
RADIUM-228	pCl/g	IHSS 201	LAKE	Ø	c c	80	1.00			0.31	1.60	1.000	0.49	0.49
STRONTIUM-89/90	pCi/g	BGCR	CREEK	60	43	43	1.00			-0.60	1.17	0.210	0.27	
STRONTIUM-89/90	bCi/g	IHSS 200	CREEK	Ø	9	9	1.00			0.13	0.30	0.220	0.08	0.37
STRONTIUM-89/90	pCi/g	IHSS 200	LAKE	S	13	13	1.00			0.11	0.57	0.308	0.14	0.46
STRONTIUM-89/90	pCi/g	IHSS 201	LAKE	S	6 0	80	1.00			0.14	0.72	0.326	0.19	0.57
TRITION	DCW.	вася	CREEK	œ	4	41	1.00			-23.20	380.00	155.870	91.83	
TRITIUM	pCi/	IHSS 200	CREEK	s	က	e	1.00			-81.00	170.00	51.930	126.16	2.43
TRITIUM	pCi/L	IHSS 201	CREEK	S	4	4	1.00			77.00	159.60	112.015	39.34	0.35
TRITIUM	pCf/L	HSS 200	LAKE	s	တ	6	1.00			-38.00	160.90	76.244	78.21	1.03
00,000	i	Ç	77.10	c	ţ	ţ	•			7	2	4 600	4	
URANIUM-233/234	D D		2000	0	ř	Ŧ	00.1			Ė	9	1.000	2	
URANIUM-233/234	pCi/g	IHSS 200	CREEK	S	7	7	1.00			0.94	2.66	1,369	0.58	0.43
URANIUM-233/234	pCi/g	HSS 201	CREEK	တ	4	41	1.00			0.62	4.70	1.452	1.03	0.71
URANIUM-233/234	pCi/g	IHSS 202	CREEK	တ	4	4	1.00			0.96	2.09	1.288	0.54	0.42
URANIUM-233/234	pCi/g	ВМ	LAKE	83						5.51	226.40	11.400		

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SUMMARY STATISTICS FOR OU 3 SURFACE SEDIMENTS COMPARISON TO BENCHMARK DATA Table B-1

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Section: Page:

								Minimum Maximum Minimum Maximum	Maximum	Minimum	Maximum			
Chemical Name	ž	Data Source	Lake or Creek	Area	Number of Detects	Number of Samples	Frequency of Detection	Nondetected Value	Nondetected Value	Detected value	Detected Value	Mean	Standard	Coefficient of Variation
URANIUM-233/234	bCl/g	IHSS 200	LAKE	s	35	35	l			5.40	5.40		0.83	0.62
URANIUM-233/234	pCi/g	IHSS 201	LAKE	Ø	37	37	1.00			0.22	2.67	1.238	0.72	0.58
URANIUM-233/234	pCi/g	IHSS 202	LAKE	တ	15	15	1.00			0.66	3.50	1.407	0.63	0.45
URANIUM-235	pCi/g	вася	CREEK	80	49	49	1.00			0.40	0.19	0.060	0.05	
URANIUM-235	pCi/g	IHSS 200	CREEK	Ø	7	7	1.00			0.03	0.20	0.072	90.0	0.86
URANIUM-235	pCi/g	IHSS 201	CREEK	တ	4	41	1.00			0.03	0.20	0.078	0.04	0.58
URANIUM-235	bCl/g	IHSS 202	CREEK	S	4	4	1.00			0.06	0.14	0.085	0.04	0.44
URANIUM-235	pCl/g	BM	LAKE	100						5.51		11.400		
URANIUM-235	pCI/g	IHSS 200	LAKE	S	35	35	1.00			0.01	0.56	0.071	0.09	1.29
URANIUM-235	pCi/g	IHSS 201	LAKE	တ	37	37	1.00			0.00	0.12	0.045	0.03	0.75
URANIUM-235	pCl/g	IHSS 202	LAKE	S	15	15	1.00			0.01	0.17	0.064	0.04	0.68
URANIUM-238	pCl/q	ВССВ	CREEK	m	DE	30	1,00			0.27	3.82	1.400		
URANIUM-238	bCi/g	IHSS 200	CREEK	ဟ	^	7	•			0.87	2.23	1.400	0.51	0.36
URANIUM-238	pCi/g	IHSS 201	CREEK	တ	4	4	1.00			0.62	3.90	1.339	0.84	0.63
URANIUM-238	pCI/g	IHSS 202	CREEK	S	4	4	1.00			0.79	2.15	1.205	0.63	0.53
URANIUM-238	bCi/g	BM	LAKE	m						5.51		11.400		
URANIUM-238	pCl/g	IHSS 200	LAKE	s	35	35	1.00			0.31	4.40	1.339	0.70	0.52
URANIUM-238	pCi/g	IHSS 201	LAKE	တ	37	37	1.00			0.20	2.42	1,223	0.70	0.57
URANIUM-238	pCi/g	IHSS 202	LAKE	တ	15	15	1.00			0.86	3,30	1.502	0.57	0.38
BGCR = Background	Geochemic	BGCR = Background Geochemical Characterization Report (DOE, 1993c).	t (DOE, 1993c).				_	HSS = Individual	IHSS = Individual Hazardous Substance Site	ınce Site.				
CC-BM = Cherry Cree	ak Reservoi	CC-BM = Cherry Creek Reservoir Surface Sediment (n=1) CCBA, 1994.	CCBA, 1994.				~	B = Background.						
RMNP-BM = Rocky M	fountain Na	RMNP-BM = Rocky Mountain National Park Lakes Surface Sediment Data (Heit.	Sediment Data (Heit	et al., 1984)	84).		,	S = OU 3 (onsite).						

הואיזי – היטימץ איטיטוחשוח אפווסחשו רישוג באנד (Heif, et al., 1984).
RMNP-BMS = Rocky Mountain National Park Lakes Subsurface Sediment Data (Heif, et al., 1984).
Lowry = Lowry Landfill Site Background Data (Stream Sediment) (EPA, 1992a).
BM = Marston Lake, Ralston Reservoir, Sterling Quad, Greeley Quad, Surface Sediment Data.

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This base This	EG&G ROCKY FLATS ENVIR CDPHE Conservative Screen for Operable Unit 3	ATS ENVIRONA ve Screen	EG&G ROCKY FLATS ENVIRONMENTAL TECHNOLOGY SIT CDPHE Conservative Screen for Operable Unit 3	LOGY SITE								Section: Page:	ë in			Appendix B 17 of 40
Part	Non-Controlled Doc	ument														
Marie Mari								윧	le B-2							
March Marc					SUMMA	RY STATI	TICS FOR G	REAT WEST	ERN RESERVO	NR SUBSURFACI DATA	ESEDIMENTS					
May of the company of the co								ш		н	Maximum	Minimum	Maximum			
M mg/kg COU3 HHS 3700 LAME 6 130 echdoo 650,000 13893.70 5467.02 M mg/kg EOCHM COLBM LAME 8 64 130 echdoo 250,000 13893.70 5467.02 mg/kg EOCHM COLBM LAME 8 64 130 echdoo 25000 25000 13893.70 5467.02 mg/kg EOCHM LAME 8 46 130 66 77 70 </th <th>Chemical Name</th> <th>Units</th> <th>DATA</th> <th>SOURCE</th> <th>Creek</th> <th>Area</th> <th>Number of Detects</th> <th></th> <th>Frequency or Detection</th> <th></th> <th>Nondetected Value</th> <th>Detected value</th> <th>Detected Value</th> <th>Arithmetic</th> <th>Standard Deviation</th> <th>Coefficient of Variation</th>	Chemical Name	Units	DATA	SOURCE	Creek	Area	Number of Detects		Frequency or Detection		Nondetected Value	Detected value	Detected Value	Arithmetic	Standard Deviation	Coefficient of Variation
4. maying COL34 CASAH CASAH CASAH LANGE 8 46 46 150 ASSOCIATION STRONGO 1388-370 150 ASSOCIATION STRONGO 150 ASSOCIATION A	METALS															
Marie Mari	ALUMINUM	mg/kg	500	IHSS 200	LAKE	ω i	46	46	1.00			6340.00	26100.00	13893.70	5457.02	0.39
mg/gg OU 3 HSS 200 LAKE B 46 100 A6 100 649 167 mg/gg OCCRA HSS 200 LAKE B 53 59 0.30 0.24 0.24 0.50 mg/gg RNMP-BMS LLLOUSE LAKE B 53 59 0.30 0.24 0.24 0.24 0.24 mg/gg RNMP-BMS LLLOUSE LAKE B A 46 1.00 A 4.00 0.00 0.05 mg/gg RNMP-BMS LLLOUSE LAKE B A 46 1.00 A	ALUMINUM ALUMINUM ALUMINUM	mg/kg mg/kg mg/kg	CC-BM BGCR LOWRY	CC-BM LOWRY	S. S		69	59	0.1			96/00:00 549:00	25200.00 32100.00	5887.610 13959.330	4912.73 7080.88	
May	ARSENIC	т9/кв	00.3	IHSS 200	LAKE	o c	\$	94	1.00			3.60	10.40	6.49	1.67	0.26
Marke-Base Liftonian Lander Base Liftonian Lander Liftonian Lander Base Liftonian Lander Base Liftonian Lander Liftoni	ARSENIC	mg/kg mg/kg	BGCR		CREEK		53	59	0.90			0.20	17.30	2.410	2.45	
Thick	ARSENIC	mg/kg ma/ka	RMNP-BMS RMNP-BMS	L.HUSTED	¥ ¥	o o								0.790 1.000	50:02	
mg/kg RMMP-BM LLMUSTED LAKE B 1.00 2.50 0.200 mg/kg RMMP-BM LLHAIYAH LAKE B 4.6 4.6 1.00 84.0 0.200 14.40 0.200 mg/kg RMMP-BM LHAIYAH LMKE B 57 1.00 84.0 1.40 0.200 mg/kg CC-BM HISS 200 LAKE B 57 57 1.00 1.660 24.00 11.40 0.200 mg/kg CC-BM HISS 200 LAKE B 57 57 1.00 65.3 1.30 0.30 mg/kg CC-BM HISS 200 LAKE B 27 57 0.47 1.60 24.00 1.50 0.200 mg/kg BOSCR LHUSTED LAKE B 27 57 0.47 1.50 1.30 0.30 1.50 mg/kg RAMP-BM LHUSTED LAKE B 27 57 0.47 1.50	ARSENIC	mg/kg	LOWRY		CREEK	1001							16.50	4.810	3.95	
mg/kg RMMP-BM LHANYAHA LAKE B 46 46 100 61.90 205.00 140 0.200 mg/kg CC-BM HFS 200 LAKE B 57 57 1.00 61.90 261.00 561.00 1.60 205.00 191.61 2.00 mg/kg CC-BM HFS 200 LAKE B 57 57 1.00 561.00 261.00 261.00 261.00 263.00 1.50 20.00 mg/kg CC-BM HFS 200 LAKE B 57 57 1.00 57.00 1.30 20.63 20.63 1.30 0.208 mg/kg CC-BM HFS 200 LAKE B 27 57 0.47 0.47 1.30 1.30 1.30 0.609 1.30 mg/kg RNMP-BM LLOUISE LAKE B 27 57 0.47 0.48 0.81 0.48 0.48 0.48 0.48 0.48 0.48 0.48	ARSENIC	mg/kg ma/ka	RMNP-BM	L.HUSTED	Z Z	00 00								2.50	0.200	
mg/kg CC-BM HSS 200 LAKE B 46 46 100 61.90 205.00 161.61 28.86 mg/kg CC-BM LAKE B 57 1.00 1.06 244.00 77.810 86.38 mg/kg LOWRY CREK B 7 1.00 4.00 200.640 77.810 86.38 mg/kg CC-BM HSS 200 LAKE B 7 57 0.47 1.50 1.30 205.640 78.59 mg/kg RAMP-BMS LL-ULISE LAKE B 27 57 0.47 1.50 1.30 0.860 1.38 mg/kg RAMP-BMS LL-ULISE LAKE B 27 57 0.47 1.50 1.30 0.860 1.30 mg/kg RAMP-BM LL-HUSTED LAKE B 2 4.6 0.48 0.38 0.81 1.30 1.30 mg/kg RAMP-BM LL-HUSTED LAKE B <t< td=""><td>ARSENIC</td><td>mg/kg mg/kg</td><td>RMNP-BM RMNP-BM</td><td>L.HAIYAHA THE LOCH</td><td>ŽŽ ŽŽ</td><td>. co co</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>8.40 1.40</td><td>0.200</td><td></td></t<>	ARSENIC	mg/kg mg/kg	RMNP-BM RMNP-BM	L.HAIYAHA THE LOCH	ŽŽ ŽŽ	. co co								8.40 1.40	0.200	
mg/kg CC-BM CC-B	BARIUM	mg/kg	003	IHSS 200	LAKE	Ø	94	94	1.00			81.90	205.00	161.61	28.96	0.18
mg/kg DGCR	BARIUM	mg/kg	CC-BM		AKE	20 1	1	;	;			591.00	00,196			
mg/kg COL3 HSS 200 LAKE 8 46 46 100 653 2.30 1.13 0.33 mg/kg RNNIP-BMS LLHUSTED LAKE 8 27 57 0.47 1.50 1.50 1.30 0.680 1.89 mg/kg RNNIP-BMS LLHUSTED LAKE 8 27 57 0.47 8 7.40 1.50<	BARIUM	mg/kg mg/kg	BGCR LOWRY		CREEK	80 80	21	24	1 .8			10.60	244.00 440.00	77.910 220.640	76.59	
mg/kg BGCR CREEK B 27 57 0.47 1.50 1.30 0.660 1.69 1.60 1.60 1.60 1.60 1.60 1.	BERYLLIUM	mg/kg mg/kg	OU 3 CC-BM	IHSS 200	Z Z K	တက	94	94	1.00			0.53 4.03	2.30	1.13	0.33	0.29
mg/kg RMNP-BMS L.HUSTED LAKE B 7400 0.30	BERYLLIUM	mg/kg	BGCR		CREEK	6 0	27	21	0.47			1.50	1.30	0.660	1.69	
mg/kg LOWRY CREEK B 2.10 1.04 mg/kg RMNP-BM L.HUSTED LAKE B 2.0 1.04 mg/kg RMNP-BM L.HAIYAHA LAKE B 2.2 46 0.48 0.38 0.81 0.59 2.60 1.10 mg/kg RMNP-BM THE LOCH LAKE B 51 0.12 6.2 46 0.48 0.38 0.81 0.59 2.60 0.74 0.62 mg/kg BG-CRM LAKE B 51 0.12 0.13 1.30 0.540 0.36 mg/kg RMMP-BMS L.LOUSE LAKE B 51 0.12 0.13 1.30 0.540 0.37 mg/kg ROWERY L.COUSE LAKE B 51 0.12 0.09 0.09 mg/kg L.COUSE LAKE B 51 0.12 0.09 0.09 0.09 mg/kg RAMP-BMS L.LOUSE B <td>BERYLLIUM</td> <td>mg/kg ma/ka</td> <td>RMNP-BMS RMNP-BMS</td> <td>L.HUSTED</td> <td>ž</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>3.900 7.400</td> <td>0.30</td> <td></td>	BERYLLIUM	mg/kg ma/ka	RMNP-BMS RMNP-BMS	L.HUSTED	ž									3.900 7.400	0.30	
mg/kg RMMP-BM L.HUSTED LAKE B 3.90 1.00 mg/kg RMMP-BM L.HUSTED LAKE B 3.90 1.00 mg/kg RMMP-BM L.HATATAH LAKE B 3.22 46 0.48 0.38 0.81 0.59 2.60 0.74 0.62 mg/kg BGCR C-BM LAKE B 6 51 0.12 0.61 1.30 mg/kg RMMP-BMS L.HUSTED LAKE B 6 51 0.12 0.13 1.30 0.54 0.35 mg/kg RMMP-BMS L.LUSTED LAKE B 6 51 0.12 0.13 1.30 0.07 mg/kg LOWRY L.LOUSE LAKE B 6 51 0.12 0.09 0.09 mg/kg RMNN-BMS L.HUSTED LAKE B 6 51 0.12 0.09 0.09 mg/kg RMNN-BMS L.HUSTED LAKE <td>BERYLLIUM</td> <td>mg/kg</td> <td>LOWRY</td> <td></td> <td>CREEK</td> <td>0</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>2.10</td> <td>20.</td> <td></td>	BERYLLIUM	mg/kg	LOWRY		CREEK	0								2.10	20.	
Third	BERYLLIUM	mg/kg	RMNP-BM	L.HUSTED	ZKE									3.90	8 8	
mg/kg CLOUS IHSS 200 LAKE B 46 0.48 0.38 0.81 0.59 2.60 0.74 0.52 mg/kg BGCBM LAKE B 6 51 0.12 0.13 1.30 0.540 0.74 0.62 mg/kg BGCBM CAMPRIAN LAKE B 6 51 0.12 0.13 1.30 0.540 0.36 mg/kg RAMIN-BMS L.LOUISE LAKE B 6 51 0.12 0.74 0.54 0.36 mg/kg RAMIN-BMS L.LOUISE LAKE B 6 51 0.12 0.74 0.59 mg/kg RAMIN-BMS L.LOUISE LAKE B 6 51 0.75 0.090 0.090	BERYLLIUM	ma/ka	RMNP-BM	LHAIYAHA	ŠŠ	a no								9.30	5 5	
mg/kg OU 3 IHSS 200 LAKE B 46 0.48 0.38 0.81 0.59 2.60 0.74 0.62 mg/kg B GC-BM CREEK B 6 51 0.12 0.38 0.13 1.30 0.540 0.36 mg/kg RIMIP-BMS L.HUSTED LAKE B A 51 0.12 0.12 0.13 1.30 0.540 0.36 mg/kg LOWPY COREK B CAREK CAREK	BERYLLIUM	mg/kg	RMNP-BM	THELOCH	LAKE	©								7.40	1.30	
mg/kg CC-RM LAKE B 6 51 0,12 0,13 1.30 0,540 mg/kg RIMIP-BMS L.HUSTED LAKE B 6 51 0,12 0,320 0,320 mg/kg RIMIP-BMS L.LOUISE LAKE B 0,090 0,090 mg/kg LOWRY CREEK B 3,80 1,040 mg/kg RIMIP-BM L.HUSTED LAKE B 0,700	CADMIUM	mg/kg	00 3	HSS 200	LAKE	ဟ	22	9 4	0.48	0.38	0.81	0.59	2.60	0.74	0.62	0.84
Might Migh	CADMIUM	mg/kg	Wa co		CAKE PER	m #	•	ī	2 13			0 13	25	0.540	85	
mg/kg kinki-baks L.LOUISE LAKE B 1.090 mg/kg LOWRY CREEK B 1.040 mg/kg RAMIP-BM L.HUSTED LAKE B 0.700	CADMIUM	By/6m	RMNP-BMS	L.HUSTED	LAKE) m	,	5	<u>.</u>			2	1	0.320	0.07	
mg/kg RMNP-BM L.HUSTED LAKE B 0.700	CADMIUM	mg/kg ma/ka	RMINP-BMS LOWRY	L.LOUISE		m ee							3.80	1040	0.99	
	CADMIUM	mg/kg	RMNP-BM	L.HUSTED	LAKE	20								0.700	9.	

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SUMMARY STATISTICS FOR GREAT WESTERN RESERVOIR SUBSURFACE SEDIMENTS COMPARISON TO BENCHMARK DATA

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Section: Page:

Lange											Maximum					
Minter M					Lake or		Number of	Number of	Frequency of	Nondetected	Nondetected	Detected	Detected	Arithmetic	Standard	Coefficient of
Minking	hemical Name	Cuits	DATA	SOURCE	Creek	Area	Detects	Samples	Detection	Value	Value	vatue	Value	Mean	Deviation	Variation
mg/ng	ADMIUM	mg/kg	RMNP-BM	LLOUISE	LAKE	8								0.500	0.20	
mg/kg	ADMIUM	mg/kg	RMNP-BM	L.HAIYAHA	LAKE	80								0.340	0.03	
mg/kg	ADMIUM	mg/kg	RMNP-BM	THE LOCH	LAKE	ø								0.320	0.05	
mg/ng GCRM LHUSTED LMKE B SS SS SS	ALCIUM	mg/kg	003	IHSS 200	LAKE	Ø	94	9	1.00			3900.00	15400.00	7568.70	2482.67	0.33
mg/kg RAMP-BMS LLOUISE LLOUISE LAKE B S6 698 6	ALCIUM	mg/kg	CC-BW		¥	00	!	!	!				20,000		0.10	3
mg/kg RMMP-BMS L-HUSTED LAKE B B B B B B B B B B	ALCIUM	mg/kg	BGCR		CREEK	•	85	59	0.98			93.50	17100.00	3658.240	4663.60	
mg/kg	ALCIUM	mg/kg	RMNP-BMS	L.HUSTED	Z K	60								12.000	2 00	
mg/kg	ALCIUM	mg/kg	RMNP-BMS	LLOUISE	Ş	60								26,500		
mg/kg	ALCIUM	mg/kg	RMNP-BM	L.HUSTED	Ž	80								26,000	1.00	
mg/kg	ALCIUM	mg/kg	RMNP-BM	L.LOUISE	Š	œ								34.100	0.10	
mg/kg H/SS 200	ALCIUM	mg/kg	RMNP-BM	L.HAIYAHA	Z	60								54,000	5,00	
MB/kg HISS 200 LAKE S 26 46 0.57 12.70 27.40 JM mg/kg HISS 200 LAKE B 46 46 1.00 7.70 27.40 JM mg/kg LOWRY CREEK B 47 59 0.80 7.70 7.74	ALCIUM	mg/kg	RMNP-BM	THELOCH	ZKE	∞								47.000	6.00	
Marke Mark	ESIUM	ma/ko	HSS 200		IAKE	ď	80	48	730	12 22	27.40	10 70	00.00	76 37	100	97.0
J.M. mg/kg HSS 200 LAKE S 46 46 1.00 J.M. mg/kg LOWRY CREEK B 47 59 0.80 mg/kg CC-BM LAKE B 46 4.00 0.73 mg/kg CC-BM LAKE B 43 59 0.73 mg/kg CC-BM LAKE B 46 4.00 0.73 mg/kg LOWRY CREEK B 46 1.00 0.73 mg/kg LOWRY CC-BM LAKE B 46 1.00 mg/kg HSS 200 LAKE B 46 0.00 0.34 0.75 mg/kg HSS 200 LAKE B 46 1.00 0.34 0.75 mg/kg HSS 200 LAKE B 59 59 1.00 mg/kg RMNIP-BMS LHUSTED LAKE B 59 59 1.00 mg/kg RMINIP-BMS </td <td>ESIUM</td> <td>mg/kg</td> <td>BGCR</td> <td></td> <td>CREEK</td> <td>· 🗠</td> <td>\$ 2</td> <td>28</td> <td>0.18</td> <td>27.7</td> <td>Qt. 17</td> <td>0.71</td> <td>157.00</td> <td>69.290</td> <td>63.88</td> <td>9</td>	ESIUM	mg/kg	BGCR		CREEK	· 🗠	\$ 2	28	0.18	27.7	Qt. 17	0.71	157.00	69.290	63.88	9
JM mg/kg BGCR CREEK B 47 59 0.80 mg/kg LOWRY CREEK B 47 59 0.60 mg/kg CC-BM LAKE B 46 1.00 mg/kg LOWRY CREEK B 43 59 0.73 mg/kg LOWRY CREEK B 46 1.00 0.73 mg/kg LOWRY CREEK B 46 1.00 0.73 mg/kg LOWRY CREEK B 46 1.00 0.75 mg/kg HSS 200 LAKE S 46 4.00 0.34 0.75 mg/kg HSS 200 LAKE B 59 59 1.00 mg/kg RMNIP-BMS LLOUSE LAKE B 59 59 1.00 mg/kg RMNIP-BM LHUSTED LAKE B 59 59 1.00 mg/kg RMNIP-BM LHUSTED LAKE B <td< td=""><td>HROMIUM</td><td>md/ka</td><td>HSS 200</td><td></td><td>1 AKF</td><td>ď</td><td>8</td><td>48</td><td>5</td><td></td><td></td><td>6</td><td>5</td><td>6</td><td>5</td><td>70.0</td></td<>	HROMIUM	md/ka	HSS 200		1 AKF	ď	8	48	5			6	5	6	5	70.0
Maying LOWRY CREEK B 46 1.00 mg/kg CC-BM LAKE B 43 59 0.73 mg/kg BGCR CC-BM LAKE B 43 59 0.73 mg/kg CC-BM LAKE B 43 46 1.00 mg/kg CC-BM LAKE B 43 59 0.73 mg/kg LOWRY CREEK B 43 59 0.73 mg/kg HSS 200 LAKE S 46 46 1.00 mg/kg HSS 200 LAKE B 59 0.73 mg/kg HSS 200 LAKE B 59 0.00 0.34 0.75 mg/kg RMNP-BMS LLOUISE LAKE B 59 1.00 mg/kg RMNP-BMS LLOUISE LAKE B 59 1.00 mg/kg RMNP-BMS LLOUISE LAKE B 59 1.00	HROMIUM	ma/ka	BGCR		CREEK	0 60	£ 5	2 6	8 6			0.90	20.10	130	5.5	6.37
mg/kg HSS 200 LAKE 8 46 46 1.00 mg/kg BGCR CC-BM LAKE 8 43 59 0.73 mg/kg CC-BM LOWRY CREEK 8 46 46 1.00 mg/kg CC-BM LAKE 8 46 46 1.00 mg/kg LOWRY CREEK 8 46 0.03 0.73 mg/kg HSS 200 LAKE 8 46 46 1.00 mg/kg HSS 200 LAKE 8 46 46 1.00 mg/kg RMNP-BMS LLOUISE LAKE 8 59 50 1.00 mg/kg RMNP-BMS LLOUISE LAKE 8 59 50 1.00 mg/kg RMNP-BM LHUSTED LAKE 8 59 59 1.00 mg/kg RMNP-BM LHUSTED LAKE 8 59 1.00 mg/kg RMNP-BM	HROMIUM	mg/kg	LOWRY		CREEK	0		}	ļ			e de la companya de l	22.90	12.350	5.5	
mg/kg CC-BM LAKE B 43 59 0.73 mg/kg LOWRY CREEK B 43 59 0.73 mg/kg CC-BA LAKE S 46 46 1.00 mg/kg CC-BA CREEK B 43 59 0.73 mg/kg LOWRY CREEK B 46 0.00 0.34 0.75 mg/kg HSS 200 LAKE S 46 46 1.00 mg/kg HSS 200 LAKE B 59 50 1.00 mg/kg RMIN-BMS LLOUISE LAKE B 59 50 1.00 mg/kg RMIN-BMS LLOUISE LAKE B 59 59 1.00 mg/kg RMIN-BMS LLOUISE LAKE B 59 59 1.00 mg/kg RMIN-BMS LLOUISE LAKE B 59 1.00 mg/kg RMIN-BMS LLO	OBALT	ma/ka	IHSS 200		AKE	so.	9	46	97			8	12.20	92	8	4,
mg/kg BGCR CREEK B 43 59 0.73 mg/kg LOWRY CREEK B 46 1.00 1.00 mg/kg CC-BM LAKE S 46 1.00 0.75 mg/kg HSS 200 LAKE S 46 0.00 0.34 0.75 mg/kg HSS 200 LAKE B 46 1.00 0.34 0.75 mg/kg HSS 200 LAKE B 59 59 1.00 mg/kg RMINI-BMS LHUSTED LAKE B 59 59 1.00 mg/kg RMINI-BMS LLOUISE LAKE B 59 59 1.00 mg/kg RMINI-BMS LLOUISE LAKE B S9 59 1.00 mg/kg RMINI-BMS LLOUISE LAKE B S9 59 1.00 mg/kg RMINI-BMS LHAYAHA LAKE B S9 59 1.00	OBALT	mg/kg	CC-BM		ZKE	₽						21.30	21.30		ļ	: :
Fig. mg/kg LOWRY CREEK B Fig. LOWRY CREEK B Fig. F	DBALT	mg/kg	BGCR		CREEK	ω	4 3	29	0.73			0.30	15.00	5.040	3.29	
EFR mg/kg LAKE S 46 1.00 FFR mg/kg CC-BM LAKE B 43 69 0.73 FFR mg/kg LOWRY CREEK B 45 60 0.73 IDE mg/kg HSS 200 LAKE S 46 0.00 0.34 0.75 mg/kg HSS 200 LAKE B 59 46 40 0.75 mg/kg RMMP-BMS LHUSTED LAKE B 59 59 1.00 mg/kg RMMP-BMS LHUSTED LAKE B 59 59 1.00 mg/kg RMMP-BM LHUSTED LAKE B S 46 1.00 mg/kg RMMP-BM LHUSTED LAKE B 59 59 1.00 mg/kg RMMP-BM LHUSTED LAKE B 59 59 1.00 mg/kg RMMP-BM LHUSTED LAKE B 59<	DBALT	mg/kg	LOWRY		CREEK	ø							14.00	9.200	2.86	
FER mg/kg	OPPER	mg/kg	IHSS 200		LAKE	ø	94	8	1,00			15.80	311.00	94.69	78.64	0.83
FR	OPPER	mg/kg	CC-BM		Ž	œ						43.40	43.40			
IDE	OPPER OPPER	mg/kg mg/kg	BGCR LOWRY		CREEK	60 60	£	29	0.73			10.15	36.70 48.30	10.150 17.580	7.86 8.98	
mg/kg HSS 200 LAKE S 46 46 1.00 mg/kg CC-8M LAKE B 59 50 1.00 mg/kg RMNP-BMS LLOUSE LAKE B 59 50 1.00 mg/kg RMNP-BMS LLOUSE LAKE B RMNP-BMS LLOUSE LAKE B mg/kg RMNP-BM LLOUSE LAKE B RMNP-BMS LAKE B mg/kg RMNP-BM LLAYAHA LAKE B A A	YANIDE	mg/kg	IHSS 200		LAKE	w		8	0.00	0.34	0.75			0.491	0.20	
mg/kg CC-BM LAKE B 59 50 mg/kg BGCR LHUSTED LAKE B 59 1.00 mg/kg RMMP-BMS L.LOUISE LAKE B B RMMP-BMS mg/kg RMMP-BM L.HOUISE LAKE B B B mg/kg RMMP-BM L.HAIYAHA LAKE B B	NO	mg/kg	IHSS 200		LAKE	v	8	4	1.00			9330.00	25600.00	17028.91	4005,91	0.24
mg/kg BGCR CREEK B 59 1.00 mg/kg RMNP-BMS L.HUSTED LAKE B SMNP-BMS L.LOUISE LAKE B mg/kg RMNP-BM L.HUSTED LAKE B RMNP-BM L.HAIYAHA LAKE B mg/kg RIMINP-BM L.HAIYAHA LAKE B RMNP-BM RMNP-BM L.HAIYAHA LAKE B	NO.	mg/kg	CC-BW		LAKE	80						49700.00	49700.00			
mg/kg RMNP-BMS L.HUSTED LAKE mg/kg RMNP-BM L.HUSTED LAKE mg/kg RMNP-BM L.LOUISE LAKE mg/kg RMNP-BM L.LOUISE LAKE mg/kg RMNP-BM L.LOUISE LAKE	S.	mg/kg	BGCR		CREEK	∞	29	59	00.1			1040.00	31400.00	8852.630	6263.19	
mg/kg RMMP-BM L.LUGISE LAKE mg/kg RMMP-BM L.LUGISE LAKE mg/kg RMMP-BM L.LUGISE LAKE mg/kg RMMP-BM L.LUGISE LAKE	N 20	mg/kg	RMNP-BMS	L.HUSTED	Ž.	c o c								1100.000	100.00	
mg/tg KMMP-BM LLOUISE LAKE mg/tg RMMP-BM LLOUISE LAKE mg/tg RMMP-BM LLOUISE LAKE	2 2	B)/KB	SWIN-PANS	LEGGISE	¥ E	20 (1900.000		
mg/kg RMNP-BM L.HAIYAHA LAKE	N N	119/kg	RMNP-BW	L'HOSTED	AKE F	20 a								1600.000	40.00	
	Š	al/am	RMNP-RM	HAIYAHA	AKE	α								2400.000	00000	
MANA TOO HALL WANDAMA CAME	NO.	a dy	RAMD-BA	THE COLUMN	AKE	a a								2200,000	300.00	

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EG&G ROCKY FLATS ENVIRONMENTAL TECHNOLOGY SITE CDPHE Conservative Screen for Operable Unit 3

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TADIA B-2 SUMMARY STATISTICS FOR GREAT WESTERN RESERVOIR SUBSURFACE SEDIMENTS COMPARISON TO BENCHMARK DATA

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				1					Minimum	Maximum	Minimum	Maximum	17.0		
Chemical Name	Units	DATA	DATA SOURCE	Creek	Area	Detects	Samples	Detection	Value	Value	value	Value	Mean	Deviation	Variation
NICKEL	mg/kg	RMNP-BM	L.HUSTED	LAKE	6								9.600	0.20	
NICKEL	mg/kg	RMNP-BM DAND-BA	L.LOUISE	LAKE	60 0								10.000	80.6	
NICKEL	gy6 m	RMNP-BM	THE LOCH	Ž	s 40								18,000	2.00	
POTASSIUM	mg/kg	HSS 200		LAKE	Ø	46	94	1.00			973.00	4000.00	2155.07	804.89	0.37
POTASSIUM	mg/kg	CC-BW		LAKE	Φ						15100.00	15100.00			
POTASSIUM	mg/kg	BGCR		CREEK	60	£	88	0.74			57.00	3770.00	835.340	749.42	
SELENIUM	mg/kg	HSS 200		Z	တ	uo.	9	0.11	0.83	1.80	0.86	2.45	0.75	0.32	0.43
SELENIUM	mg/kg	OC-BM		LAKE	60						1.10	1.10	·	!	!
SELENIUM	mg/kg	BGCR		CREEK	60	13	58	0.22			0.10	2.90	0.420	0.56	
SELENIUM	mg/kg	RMNP-BMS	L.HUSTED	Z Z	.								0.900	0.20	
SELENIUM	g way	RMNP-BM	HUSTED	X X	0 60								280	9 7	
SELENIUM	mg/kg	RMNP-BM	LLOUISE	ž	. m								1.200	0.10	
SELENIUM	mg/kg	RMNP-BM	L.HAIYAHA	Ž	6								1.800	0.40	
SELENIUM	mg/kg	RMNP-BM	THE LOCH	LAKE	ω								1.100	0.30	
SILVER	mafka	HSS 200		IAKE	ď	35	46	92.0	000	8	5	16.50	3.48	3.85	
SILVER	mg/kg	WA-CO-		LAKE	- 40		<u>!</u>) :		!	0.05	90.0	! i	}	:
SILVER	mg/kg	BGCR		CREEK	60	7	2	9.04			0.20	3.40	0.660	0.52	
SODIUM	ma/ka	IHSS 200		LAKE	Ø	46	46	1.00			74.60	224.00	136.05	29.69	0.22
SODIUM	mg/kg	BGCR		CREEK	•	4	Z	0.80			162.00	637.00	161.470	136.80	
STRONTIUM	mg/kg	HSS 200		Ą	Ø	84	94	1.00			35.00	88.40	61.05	12.54	0.21
STRONTIUM	mg/kg	CC-BM		LAKE	&	:	i	;			202.00	202.00	;	;	
STRONTIUM	mg/kg	BGCR		CREEK	6	4	86	0.83			2.80	421.00	36.380	59.87	
THALLIUM	mg/kg	HSS 200		Z	Ø		94		0.36	1.20			0.35	0.12	0.35
THALLIUM	mg/kg	B GCR		CREEK	₩.	2	8	9.				0.40	0.300	0.23	
N.	mg/kg	IHSS 200		LAKE	so :	17	94	0.37	1.60	3.30	1.70	6.00	2.16	1.47	0.68
	mg/kg	BGCR		CREEK		9	2 6	0.30				27.10	7.640	6.09 60.0	
	200	T CAN		כאכנ	0							0.0	13.9/0	70.7	
VANADIUM	mg/kg	IHSS 200		LAKE	တ	46	46	1.00			17.20	60.40	36.11	11.28	0.31
VANADIUM	mg/kg	MA CO		¥ ;	10 (1	;	;			115.00	115.00	;	;	
VANADIUM	mg/kg ma/ka	BGCK RMNP-BMS	L.HUSTED		n 10	8	ò	0.93			2.00	/3.00	18,330	3.00	
VANADIUM	mg/kg	RMNP-BMS	LLOUISE	Š	m								32.800		
VANADIUM	mg/kg	LOWRY		CREEK	∞							72.90	33,310	11.66	

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> Table B-2 SUMMARY STATISTICS FOR GREAT WESTERN RESERVOIR SUBSURFACE SEDIMENTS COMPARISON TO BENCHMARK DATA

				l eke or		Mumber	Mumber	Minimum Minimum Comment of Minimum	Minimum Maximum Minimum	Maximum	Minimum	Maximum	A-10 F	7	
Chemical Name	Units	DATA	DATA SOURCE	Creek	Area	Detects	Samples	Detection	Value	Value	Value	Vatue	Mean	Deviation	Coefficient of Variation
VANADIUM	ma/ka	RWNP-BM	L.HUSTED	LAKE	8								27.300	0.10	TO THE PARTY OF TH
VANADIUM	mg/kg	RMNP-BM	LLOUISE	LAKE	6								35.000	88	
VANADIUM	mg/kg	RWNP-BM	L.HAIYAHA	LAKE	60								55.000	6.00	
VANADIUM	mg/kg	RMNP-BM	THE LOCH	LAKE	•								43.000	3.00	
ZINC	mg/kg	IHSS 200		LAKE	Ø	46	84	9.1			46.20	480.00	186.65	108 62	0.58
ZINC	mg/kg	CC-BM		LAKE	62						158.00	158.00			
ZINC	mg/kg	BGCR		CREEK	æ	55	58.00	0.95			3.25	155,00	43.770	30.23	
ZINC	mg/kg	RMNP-BMS	L.HUSTED	LAKE	æ								80.000	13.00	
ZINC	mg/kg	RMNP-BMS	L.LOUISE	ZKE	€0								155,000		
ZINC	mg/kg	LOWRY		CREEK	~							726,00	76.750	124.61	
ZINC	mg/kg	RMNP-BM	L.HUSTED	LAKE	₽								117.000	2.00	
ZINC	mg/kg	RWNP-BM	LLOUISE	LAKE	œ								125.000	3.00	
ZINC	mg/kg	RWNP-BM	L.HAIYAHA	ZKE	Φ.								72.000	4.00	
ZINC	mg/kg	RMNP-BM	THE LOCH	Z	ω								95.000	9.00	
RADIONUCLIDES															
AMERICIUM-241	pCi/a	003	IHSS 200	ŞKE	v	Q	5	1.00			000	102	0.24	0.34	13
AMERICIUM-241	pCi/g		BGCR	CREEK	. c a	35	8	1.00			0.04	0.82	0.070	0.19	į
PLUTONIUM-239/240	pCi/g	OU 3	IHSS 200	LAKE	G	9	8	1.00			0.00	4.03	0.73	1.07	1.46
PLUTONIUM-239/240	bÇ/Q		BGCR	CREEK	0	42	42	1.00			0.00	2.36	0.170	0.59	!
PLUTONIUM-239/240	pCi/g		BM BM	ZKE	∞			,			0.02	0.13	0.130		
PLUTONIUM-239/241	pOi/g	HR-BM	HALLIGAN	Ž	Φ						0.02	9.05			
PLUTONIUM-239/242	pCI/g	WL-BM	WELLINGTON	ZAKE	æ						20.0	0.19			
POLONIUM-210	pCl/g	OU 3	IHSS 200	LAKE	တ	4	4	1.00			1.05	3.14	2.00	0.53	0.26
URANIUM-233/234	BCI/B	OU 3	HSS 200	ZAKIE	တ	64	2	1.00			0.75	3.90	1.32	0.41	0.31
URANIUM-233/234 URANIUM-233/234	6/JOd		BGCR BM	CREEK LAKE	ø ø	74	41	1.00			0.14 5.51	4.50 11.400	1.680	1.15	<u>;</u>
URANIUM-235	pCi/a	003	HSS 200	Z	Ø	46	25	1.00			60	0.21	90	20	984
URANIUM-235 URANIUM-235	pCI/g		BGCR BM	CREEK LAKE		49	49	1.00			0.40 5.51	0.19 11.400	0.060	0.05	į
1 IDANII IMA 238	Ş	ř.	Hee 300	IAVE	v	84	79	5			2	6	101		
URANIUM-238 URANIUM-238	6,00d	3	BGCR BM	Z Z Z	, 60 60	8.3	8 %	90.			0.27 5.51	3.82 11.400	1.400	1.03	770

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SUMMARY STATISTICS FOR GREAT WESTERN RESERVOIR SUBSURFACE SEDIMENTS COMPARISON TO BENCHMARK DATA

Table B-2

Chemical Name Units DATA SOURCE Creek Area Defected Number of Nation Nation of Number of Nation Nation of Number of Nation Nation of Nation of Nation Nation of Nation of Nation of Nation Nation of Nation of Nation Nation of									Minimum	Maximum	Minimum	Maximum			
Units DATA SOURCE Creek Area Detects Samples Detection Value Value Value Mean Id Geochemical Characterization Report (DOE, 1993c). Raiston Reservoir, Sterling Quad, Greeley Quad, Surface Sediment Data. Sek Reservoir Surface Sediment (n = 1) (CCBA, 1994). Asservoir Subsurface Sediment (n = 1) (CCBA, 1994). All Site Background Data (Stream Sediment Data (Heit, et al., 1992a). Mountain National Park Lakes Surface Sediment Data (Heit, et al., 1984). In Lake Subsurface Sediment Data (Cohen et al., 1990).				Lake or		Number of	Number of	Frequency of	Nondetected	Nondetected	Detected	Detected	Arithmetic	Standard	Coefficient of
B = Background Geochemical Characterization Report (DOE, 1933c). BAGCH = Background Geochemical Characterization Report (DOE, 1933c). BAGCH = Background Geochemical Characterization Data. CC-BM = Cherry Creek Reservoir, Streting Quad, Greeley Quad, Surface Sediment (n = 1) (CCBA, 1994). HT-SB = Haridapa Reservoir Subsurtace Sediment Data (Cchen et al., 1990). HT-SB = Individual Hazardous Substance Streting and Sediment Data (Helt, et al., 1994). RMNP-BMS = Individual Hazardous Substance Sediment Data (Helt, et al., 1984). RMNP-BMS = Rocky Mountain National Park Lakes Surface Sediment Data (Helt, et al., 1984). S = OU 3 (onsite). WL-BM = Wellington Lake Subsurface Sediment Data (Helt, et al., 1990).	Chemical Name	Units	DATA SOURCE	Creek	Area	Detects	Samples	Detection	Value	Value	value	Value	Mean	Deviation	Variation
BGCR = Background Geochemical Characterization Report (DDE, 1993c), BM = Martin Lake, Raisan Reservoir, Sterling Quard, Sterled Sediment Data. CBM = Cherry Creek Reservoir Surface Sediment (in = 1) (ICBM, 1994). HR.BM = Heiligan Reservoir Subsurface Sediment Data (Cchen et al., 1990). HRSS = Individual Hazarchous Substance Sediment Data (Cchen et al., 1990). RMKP-BM = Rocky Mourtain National Park Lakes Surface Sediment Data (Heit, et al., 1984) RMNP-BMS = Rocky Mourtain National Park Lakes Surface Sediment Data (Heit, et al., 1984) S = NO 3 (onsite). WL-BM = Wellington Lake Subsurface Sediment Data (Cohen et al., 1990).	B = Background.														
BM = Marston Lake, Raiston Reservoir, Sterling Quad, Greeley Quad, Surface Sediment Data. CCBM = Charry Creek Reservoir Surface Sediment Data. CCBM = Charry Creek Reservoir Surface Sediment Data (Corban et al., 1994). HSM = Helligh Reservoir Substance Sediment Data (Corban et al., 1990). HSS = Individual Hazardous Substance Side. Lowny = Lowny Landfill Site Background Data (Stream Sediment) (EPA, 1992a). HMMN-BMS = Rocky Mountain National Park Lakes Surface Sediment Data (Heit, et al., 1984) RAMP-BMS = Rocky Mountain National Park Lakes Subsurface Sediment Data (Heit, et al., 1984) S = OU 3 (onsite).	BGCR = Background	Geochemical Characteriza	tilon Report (DOE, 1993c).												
CC-BM = Cherry Creek Reservoir Surface Sediment (n = 1) (CCBA, 1994). HRS Me Haligan Reservoir Subsurdace Sediment Data (Cohen et al., 1990). HRS Me Haligan Reservoir Subsurdace Sediment Data (Cohen et al., 1990). Lowry = Lowry Landfill Site Background Data (Stream Sediment) (EPA, 1992a). RMMV-BMS = Individual Park Lakes Surface Sediment Data (Heit, et al., 1984) RMNV-BMS = Rocky Mourtain National Park Lakes Subsurface Sediment Data (Heit, et al., 1984) S = CU 3 (orisite). WL-BM = Wellington Lake Subsurface Sediment Data (Cohen et al., 1990).	BM = Marston Lake, F.	Relation Reservoir, Sterling	Quad, Greeley Quad, Surfac	e Sediment Da	ei.										
HH-BM = Halligan Reservoir Subsurface Sediment Data (Cohen et al., 1990). HISSS = Individual Hastadrous Subsurface Std. Hindulal Hastadrous Subsance Std. Lowy = Lowy, Landill Side Background Data (Stream Sediment) (EPA, 1992a). HAMP-BM = Rocky Mountain National Park Lakes Surface Sediment Data (Heit, et al., 1984) HAMP-BMS = Rocky Mountain National Park Lakes Subsurface Sediment Data (Heit, et al., 1984) S = CU 3 (onstel). WL-BM = Wellington Lake Subsurface Sediment Data (Cohen et al., 1990).	CC-BM = Cherry Cree	* Reservoir Surface Sedin	nent (n = 1) (CCBA, 1994).												
HSS = Individual Hazardous Substance Site. cowry = Lowry Landfill Site Background Data (Sitean Sediment Data (Heit, et al., 1984) AMNP-BME = Rocky Mountain National Park Lakes Surface Sediment Data (Heit, et al., 1984) 5 = OU 3 (onsite). 5 = OU 3 (onsite). ML-BM = Wellington Lake Subsurface Sediment Data (Cohen et al., 1990).	HR-BM = Halligan Re	servoir Subsurface Sedime	ent Data (Cohen et al., 1990).												
Lowry = Lowry Landfill Ste Background Data (Stream Sediment) (EPA, 1992a). 13MNP-BME = Rocky Mountain National Park Lakes Surface Sediment Data (Heit, et al., 1984) 13MNP-BMS = Rocky Mountain National Park Lakes Subsurface Sediment Data (Heit, et al., 1984) 13 = OU 3 (onsite). 14.BM = Wellington Lake Subsurface Sediment Data (Cohen et al., 1990).	HSS = Individual Haz	ardous Substance Site.													
RMMP-BM = Rocky Mountain National Park Lakes Surface Sediment Data (Heit, et al., 1984) RMMP-BMS = Rocky Mountain National Park Lakes Subsurface Sediment Data (Heit, et al., 1984) S. = CU 3 (onstel). WL-BM = Wellington Lake Subsurface Sediment Data (Cohen et al., 1990).	Lowry = Lowry Landfill	1 Site Background Data (St	tream Sediment) (EPA, 1992.	a).											
RAMNP-BMS = Rocky Mountain National Park Lakes Subsurface Sediment Data (Heit, et al., 1984) S = OU 3 (onsite). ML-BM = Wellington Lake Subsurface Sediment Data (Cohen et al., 1990).	RMNP-BM = Rocky M	fountain National Park Lak	es Surface Sediment Data (h.	leit, et al., 1984	_										
S = OU 3 (onsite). ML-BM = Wellington Lake Subsurface Sediment Data (Cohen et al., 1990).	RMNP-BMS = Rocky	Mountain National Park La	ikes Subsurface Sediment Da	ata (Heit, et al.,	1984)										
ML-BM = Wellington Lake Subsurface Sediment Data (Cohen et al., 1990).	S = OU 3 (onsite).														
	VL-BM = Wellington L	ake Subsurface Sedimen:	t Data (Cohen et al., 1990).												
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TABLE B-3 COMPARISON TO BENCHMARK DATA-SURFACE WATER

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Coefficient of Variation Standard Deviation Mean* Maximum Detected Value Maximum Minimum Nondetected Detected Value value Minimum Nondetected Value Frequency of Detection Number of Number of Detects Samples Main Test Group Code Chemical Name New Unit Data Source Area Detects
NOTE:
BM-CR = Benchmark Stream Values (Raiston Creek, Croke Canal, Farmer's Highline canal (Arvada, 1994))

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TABLE B-3 COMPARISON TO BENCHMARK DATA-SURFACE WATER

					Number of	Number of	Frequency of	Minimum	Maximum Nondetected	Minimum Detected	Maximum Detected		Standard	Coefficient of
Main Test Group Code	Chemical Name	New Unit	Data Source	Area	Detects	Samples	Detection	Nondetected Value	Value	value	Vafue	Mean*	Deviation	Variation
NOTE:														
BM-CR = Benchmark Strea	BM-CR ≃ Benchmark Stream Values (Raiston Creek, Croke Canal, Farmer's Highline canal (Arvada, 1994))	Croke Canal, F	armer's Highline c	anal (Arva	da, 1994))									
BM-LK ≈ Benchmark Lake	BM-LK ≈ Benchmark Lakes/Reservoir Values (Chatfield Reservoir, Cherry Creek, Bear Creek Lake, and Harriman Lake (Arvada, 1994; EPA, 1993 and 1994)	eld Reservolr, (Therry Creek, Bear	· Creek Lak	te, and Harrim	ıan Lake (Arva	da, 1994; EPA, 19	93 and 1994))						
TOTAL-METALS	ARSENIC	hg/L	CREEK	တ	ღ	80	0.38	2.60	3.20	0.70	1.30	1.25	0.31	0.25
TOTAL-METALS	ARSENIC	µ9/L	500	Ø	g	19	0.32	1.90	2.90	0.70	2.90	1.32	0.59	0.44
TOTAL-METALS	ARSENIC	J/gr	201	s		20		2.20	3.20			1.45	0.18	0.13
TOTAL-METALS	ARSENIC	1,6rl	202	တ	13	13	1.00			3.10	6.60	4.92	0.94	0.19
TOTAL-METALS	ARSENIC	hg/L	BM-CR	8		18		5.00	5.00					
TOTAL-METALS	ARSENIC	hg/L	BM-LK	6		106					10.00			
DISSOLVED-METALS	BARIUM	J/Srt	BGCR	62	102	14	0.71	24.50	200:00	18.80	391,00	48.63	34.98	0.72
DISSOLVED-METALS	BARIUM	hg/L	CREEK	S	8	6	1.00			20.70	43.10	28.40	12.74	0.45
DISSOLVED-METALS	BARIUM	J/G/I	200	တ	91	16	1.00			20.70	48.90	37.01	6.39	0.17
DISSOLVED-METALS	BARIUM	μg/L	201	တ	48	18	1.00			21.40	43.10	35.11	4.18	0.12
DISSOLVED-METALS	BARIUM	µg/L	202	S	13	13	1.00			20.30	31.40	24.69	3.31	0.13
TOTAL-METALS	BARIUM	ng/L	BGCR	8	112	131	0.85	45.50	200.00	26.40	306.00	63.69	31.66	0.50
TOTAL-METALS	BARIUM	µg/L	CREEK	တ	89	89	1.00			25.40	80.10	37.84	18.36	0.49
TOTAL-METALS	BARIUM	hg/L	200	ဟ	19	19	1.00			27.00	80.10	43.09	11.49	0.27
TOTAL-METALS	BARIUM	hg∕L	201	S	50	50	1.00			25.40	44.50	35,89	4.52	0.13
TOTAL-METALS	BARIUM	µ9/L	202	တ	5	43	.			20.40	34.70	25.98	3.60	0.14
TOTAL-METALS	BARIUM	J/84	BM-LK	æ		75	•				250.00	47-103		
DISSOLVED-METALS	BERYLLIUM	µg/L	BGCR	60	80	88	0.09	0.20	8.00	0.65	17.00	1.08	1.88	1.74
DISSOLVED-METALS	BERYLLIUM	µg∕L	CREEK	တ	0	ღ	00.0	0.40	0.40			0.20		
DISSOLVED-METALS	BERYLLIUM	µg/L	200	တ		16		0.30	0.40			0.17	0.03	0.15
DISSOLVED-METALS	BERYLLIUM	µg/L	201	တ		18		0:30	0.40			0.18	0.03	0.15
DISSOLVED-METALS	BERYLLIUM	hg/L	202	တ		5		0.30	0.40			0.17	0.03	0.15
TOTAL-METALS	BERYLLIUM	μg/L	BGCR	8	6	115	0.08	0.20	5.00	09:0	4.80	0.78	0.87	1.12
TOTAL-METALS	BERYLLIUM	µg∕L	CREEK	တ	-	6 0	0.13	0:30	09:0	0.36	0.36	0.25	0.07	0.29
TOTAL-METALS	BERYLLIUM	hg∕L	200	တ	-	19	0.05	0:30	09:0	0.40	0.40	0.20	0.07	0.35
TOTAL-METALS	BERYLLIUM	µg/L	201	တ	-	20	90.0	0:30	0.40	0.36	0.36	0.18	0.05	0.27
TOTAL-METALS	BERYLLIUM	µ9/L	202	တ		13		0:30	0.40			0.17	0.03	0.15
TOTAL-METALS	BERYLLIUM	µg/L	BM-LK	ω.		45			2.00					
DISSOLVED-METALS	CADMIUM	µg/L	BGCR	æ	ß	11	0.06	1.40	5.00	2.30	3.50	1.77	0.62	0.35
DISSOLVED-METALS	CADMIUM	J/G/L	CREEK	တ	-	၉	0.33	1.40		2.50	2.50	1.30	1.04	0.80
DISSOLVED-METALS	CADMIUM	ng/L	200	Ś	-	16	90.0	1.40	1.50	1.50	1.50	0.78	0.19	0.25
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						Ā	TABLE B-3							
					COMPARIS	ON TO BENCH	COMPARISON TO BENCHMARK DATA-SURFACE WATER	RFACE WATER						
					Number of	Number of	Frequency of	Minimum	Maximum Nondetected	Minimum Detected	Maximum Detected	100	Standard	Coefficient of
Main Test Group Code	Chemical Name	New Onit	Data Source	Area	Detects	Samples	Detection	Nonderected Value	varue	Value	value	wean	Deviation	Variation
BM-CR = Benchmark Stream Values (Ralston Creek, Croke Canal, Farmer's Highline canal (Values (Raiston Creek,	Croke Canal, F	armer's Highline c	anal (Arv	Arvada, 1994))									
BM-LK = Benchmark Lakes/Reservoir Values (Chaffield Reservoir, Cherry Creek, Bear Creek Lake, and Harriman Lake (Arvada, 1994; EPA, 1993 and 1994))	Reservolr Values (Chatfi	eld Reservoir, (Cherry Creek, Beat	r Creek La	ike, and Harrin	nan Lake (Arva	da, 1994; EPA, 1							
DISSOLVED-METALS	CADMIUM	hg∕L	201	တ	8	4	0.11	1.40		2.50	2.50	0.93	0.57	0.62
DISSOLVED-METALS	CADMIUM	rg/F	202	တ	•	13	0.08	1.40	1.50		1.80	0.82	0.30	0.36
DISSOLVED-METALS	CADMIUM	hg/L	BM-CR	80		83		 			2.50			
TOTAL-METALS	CADMIUM	µg∕L	BM-LK	60 :		142	;	0.10			7.00	0.23-1.33		
TOTAL-METALS	CADMIUM	µg/L	BGCR	æ	က	108	0.03	1.40			4.20	1.69	0.68	0.40
TOTAL-METALS	CADMIUM	иg/L	CHEEK	တ	က	80	0.38	1.40			2.80	1,47	0.93	0.63
TOTAL-METALS	CADMIUM	µg∕L	200	တ	6	19	0.16	1.40	2.30		2.80	1.02	0.64	0.63
TOTAL-METALS	CADMIUM	hg/L	201	ဟ	•	20	0.05	1.40			2.40	0.81	0.37	0.46
TOTAL-METALS	CADMIUM	µg/L	202	တ	CV.	13	0.15	1.40		4.00	9.00	1.62	2.39	1.48
DISSOLVED-METALS	CALCIUM	uo/L	ВВСВ	100	153	153	1.00			6760.00	79300.00	24056.86	10904.89	0.45
DISSOLVED-METALS	CALCIUM	מקר	CREEK	တ	ø	ဇ	1.8			13900.00	27200.00	18566.67	7484.87	0,40
DISSOLVED-METALS	CALCIUM	rg/L	200	s	16	16	1.00			13900.00	22000.00	19156.25	1822.44	0.10
DISSOLVED-METALS	CALCIUM	1/6rt	201	တ	18	18	4.8			14600.00	27200.00	23127.78	2520.46	0.11
DISSOLVED-METALS	CALCIUM	hg/L	202	တ	13	13	1.00			11200.00	14200.00	12792.31	1028.32	0.08
TOTAL-METALS	CALCIUM	µg/L	BGCR	ю	153	153	1.00			5505.75	74600.00	24071.96	10675.23	0.44
TOTAL-METALS	CALCIUM	μg/L	CREEK	တ	80	80	1.00			11000.00	47200.00	21212.50	12141.48	0.57
TOTAL-METALS	CALCIUM	hg/L	500	တ	19	19	1.00			11000.00	47200.00	19621.05	7339.13	0.37
TOTAL-METALS	CALCIUM	hg/L	201	s i	50	50	1.00			12600.00	26100.00	22085.00	3340.39	0.15
TOTAL-METALS	CALCIUM	hg/r	202	ທເ	£ 3	13	1,00			11100.00	13900.00	12676.92	840.79	0.07
IOIAL-METALS	CALCIOM	J.Or.	BM-LK	מ	4						72000.00	33290-37380		
DISSOLVED-METALS	CESIUM	µg/t	BGCR	60	6	46	0.09	2.00	2500.00	90.00	200.00	355.86	281,41	0.79
DISSOLVED-METALS	CESIUM	µg/L	CREEK	တ	0	9	00'0	20'00				25.00		
DISSOLVED-METALS	CESIUM	µg/L	500	s	4	16	0.25	20.00			60.00	31.88	12.50	0.39
DISSOLVED-METALS	CESIUM	µg/L	201	S	τC	48	0.28	20.00			80.00	34.72	17.19	0.50
DISSOLVED-METALS	CESIUM	µg/L	202	Ø	4	13	0,31	20.00			80.00	36.54	19.51	0.53
TOTAL-METALS	CESIUM	hg/L	BGCR	Δ.	10	120	0.08	2.00	CV.	20.00	400.00	241.78	184.80	0.76
TOTAL-METALS	CESIUM	hg/L	CREEK	ဟ	0	6 0	0.00	20.00				109.38	116.45	1.06
TOTAL-METALS	CESIUM	hg/L	500	တ	ഗ	19	0.26	50.00	w,	20.00	90:00	69.21	82.15	1.19
TOTAL-METALS	CESIUM	µg/L	201	တ		50		20.00				25.00		
TOTAL-METALS	CESIUM	hg/L	202	တ	eo ,	.	0.23	50.00	20.00	20.00	80.00	33.85	17.93	0.53
DISSOLVED-METALS	CHROMIUM	hg/L	ВВСЯ	6 0	6	88	0.10	2.00	20.00	2.10	14.80	3.24	2.69	0.83

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TABLE B-3 COMPARISON TO BENCHMARK DATA-SURFACE WATER

									Maximim	Minimum	Maximim			
				_	Number of	Number of	Frequency of	Minimum	Nondetected	Detected	Detected		Standard	Coefficient of
Main Test Group Code	Chemical Name	New Unit	Data Source	Area	Defects	Samples	Detection	Nondetected Value	Value	vafue	Value	Mean*	Deviation	Variation
NOTE:														
BM-CR = Benchmark Stream Values (Raiston Creek, Croke Canal, Farmer's Highline canal (Arvada, 1994))	Values (Raiston Creek	, Croke Canal, F	armer's Highline	canal (Arva	da, 1994))									
BM-LK = Benchmark Lakes/Reservoir Values (Chatfield Reservoir, Cherry Creek, Bear Creek Lake, and Harriman Lake (Arvada, 1994; EPA, 1993 and 1994)	Reservoir Values (Chatt	Held Reservoir, (Cherry Creek, Bea	ar Creek Lak	(e, and Harrim	an Lake (Arva	da, 1994; EPA, 1:	993 and 1994))						
DISSOLVED-METALS	CHROMIUM	hg/L	CREEK	S	0	ဇ	00:0	3.70				1.85		
DISSOLVED-METALS	CHROMIUM	ng/L	500	s		16		2.60	3.70			1.54		
DISSOLVED-METALS	CHROMIUM	tig/L	201	Ø	-	18	90:0			3.80	3.80	1.71	0.59	0.34
DISSOLVED-METALS	CHROMIUM	hg/L	202	Ø	-	13	0.08	2.60		3.40	3.40	1.67		
DISSOLVED-METALS	CHROMIUM	7/bri	BM-CR	8		14		5.00						
DISSOLVED-METALS	CHROMIUM	1/6r	BM-LK	ø		ro.					8.00			
TOTAL-METALS	CHROMIUM	1/8/1	BM-CR	В		18		5.00	5.00		2.00			
TOTAL-METALS	CHROMIUM	hg/L	BM-LK	B		145				1.00	.,	1.52-3.67		
TOTAL-METALS	CHROMIUM	ng/L	BGCR	B	19	120	0.16	2:00	13.50			3.64		
TOTAL-METALS	CHROMIUM	rg/L	CREEK	တ	-	80	0.13	2.00		2.90	2.90	1.59	99.0	0.41
TOTAL-METALS	CHROMIUM	no/L	200	တ	2	19	0.11	2:00				1.72		_
TOTAL-METALS	CHROMIUM	ng/L	201	တ	8	20	0.10	2.60	3.70		2.90	1.70		-
TOTAL-METALS	CHROMIUM	Hg/L	202	Ø	-	13	0.08	2.60		•	•	6.47	•	
	1		0	í	ć	8	Ċ	· ·		9				•
DISSOLVED-ME I ALS	COBALI	HØL	בו	n ·	9	8	50.00 1	2.00		2.40	5.5	90.4	07.0	
DISSOLVED-METALS	COBALT	µg/L	CREEK	တ	0	ဇာ	0.00	2:30				1.15		
DISSOLVED-METALS	COBALT	ng∕L	500	တ	-	16	90:0	-130		1.90	1.90	0.95		
DISSOLVED-METALS	COBALT	Hg/L	201	တ		18		1,30				0.90		
DISSOLVED-METALS	COBALT	µg/L	202	Ø	-	13	90:0	1.30				0.93		
TOTAL-METALS	COBALT	ηδ/Γ	BGCR	Ф	80	116	0.07	2:00		2.70	7.90	5.3		
TOTAL-METALS	COBALT	ng/L	CREEK	Ø	0	60	000	1.30	2.70			1.10	0.29	0.27
TOTAL-METALS	COBALT	ηδη.	500	တ	6	19	0.16	1.30		1,50		1.1		
TOTAL-METALS	COBALT	hg/L	201	တ	2	50	0.10	1.30			1.90	0.97		
TOTAL-METALS	COBALT	1/61	202	တ		13		1.30				0.84		
TOTAL-METALS	COBALT	Hg/L	BM-LK	m		2					4.00	1.00		
DISSOLVED-METALS	COPPER	µg/L	BGCR	æ	48	124	0.39	2.00	••		.,	6.07		0.84
DISSOLVED-METALS	COPPER	µg/L	CREEK	တ	8	က	0.67	2.40				4.93		
DISSOLVED-METALS	COPPER	J/Br/	500	တ	G.	16	0.56	1.90	2.40	2.00		3.15	2.67	
DISSOLVED-METALS	COPPER	1/6/1	201	တ	9	18	0.33	1.90				1.7		
DISSOLVED-METALS	COPPER	ng/L	202	s	2	12	0.45	1.90				1.94		
DISSOLVED-METALS	COPPER	ng/L	BM-CR	ω		34		1.00	_		49.00			
TOTAL-METALS	COPPER	J/bri	BM-LK	6		166		1.00	_		31.00	2.5-5.97		
TOTAL-METALS	COPPER	hg/L	BGCR	8	47	121	0.39	2.00	25.60	2.60		5.35	4.21	0.79

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EG&G POCKY FLATS ENVIRONMENTAL TECHNOLOGY SITE		
CDPHE Conservative Screen		
for Operable Unit 3	Section:	Appendi
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COMPARISON TO BENCHMARK DATA-SURFACE WATER		

									Maximum	Minimum	Maximum			
1	;	:	1		-	Number of	Frequency of	Winimum	Nondetected	Detected	Detected		Standard	Coefficient of
Main Test Group Code	Chemical Name	New Unit	Data Source	Area	Detects	Samples	Detection	Nondetected Value	Value	value	Value	Mean*	Deviation	Variation
NOTE:														
BM-CR = Benchmark Stream Values (Raiston Creek, Croke Canal, Farmer's Highline canal (Arvada, 1994))	n Values (Raiston Creek,	Croke Canal, I	≒armer's Highline α	anal (Arva	ıda, 1994))									
BM-LK = Benchmark Lakes/Reservoir Values (Chatfield Reservoir, Cherry Creek, Bear Creek Lake, and Harriman Lake (Arvada, 1994; EPA, 1993 and 1994)	Reservoir Values (Chatfi	ald Reservoir,	Cherry Creek, Bea	r Creek La	ke, and Harrim	an Lake (Arva	rda, 1994; EPA, 19	193 and 1994))						
TOTAL-METALS	COPPER	hg/L	CREEK	S	7	8	0.88	2.30		5.80	20.90	13.24	7.40	0.56
TOTAL-METALS	COPPER	µg/L	200	S	13	15	0.87	1.90		4.30	20.90	9.25	6.35	0.69
TOTAL-METALS	COPPER	ng/L	201	တ	16	17	0.94	1.90	1.90	2.80	16.50	5.84	4.25	0.73
TOTAL-METALS	COPPER	µ9/L	202	s	6	5	0.23	1.90	2.40	2.20	4.50	1.58	1.1	0.70
TOTA! -META! S	CYANIDE	Ç	ВЭСВ	æ	•	35	0.08	1.50	0000	00	0.50	0.50	07.0	+
TOTAL-METALS	CYANIDE	10/1	500	ď	ı	15		10.00		ì	ì	20.5	1	2
TOTAL-METALS	CYANIDE	l /on	201	ဟ	-	9	0.063	10.00		21.50	21.50	6.03	4.13	
TOTAL-METALS	CYANIDE	1/6rl	202	တ		ŧ		10.00				5.00	2	
DISSOLVED-METALS	IRON	µg/L	BGCR	82	107	152	0.70	3.00	316.00	9:30	1060.00	145.45	177.80	1.22
DISSOLVED-METALS	IRON	µg/L	CREEK	တ	9	ဇ	1.00			19.80	228.00	122.27	104.14	0.85
DISSOLVED-METALS	NOH	hg/L	200	တ	12	15	0.80	4.00	16.30	6.60	572.00	93.62	144.89	1.55
DISSOLVED-METALS	IRON	hg/L	201	တ	12	15	0.80	16.30	16.30	11.00	228.00	36.10	54.28	1.50
DISSOLVED-METALS	HON	hg/L	202	s	13	13	1.00			7.00	71.10	35.46	22.08	0.62
DISSOLVED-METALS	IRON	ηð/Γ	BM-CR	œ		33		10:00			1900.00			
DISSOLVED-METALS	NON	hg/L	BM-LK	æ		20					80.00			
TOTAL-METALS	HON	hg/L	BM-CR	æ		38		10.00			3300.00			
TOTAL-METALS	NON	µg/L	BM-LK	6 0		191		10.00			1643.00	233-631		
TOTAL-METALS	IRON	hg/L	BGCR	œ	147	157	0.94	82.75	478.00	9.70	26300.00	1261.17	2865.13	2.27
TOTAL-METALS	NON	hg/L	CREEK	တ	89	8	1.00			453.00	2340.00	1218.88	719.98	0.59
TOTAL-METALS	HON	hg/L	500	တ	19	19	1.00			40.70	2340.00	1115.04	685.21	0.61
TOTAL-METALS	IRON	hg/L	201	ဟ	50	20	1.00			37.70	1150.00	401.56	332.31	0.83
TOTAL-METALS	IRON	hg/L	202	တ	1 3	13	1.00			56.50	328.00	156.69	75.05	0.48
DISSOLVED-METALS	LEAD	hg/L	BGCR	00	52	112	0.22	0.40	13.10	0.70	7.20	1.29	1.22	0.94
DISSOLVED-METALS	LEAD	µg/L	CREEK	တ	ဗ	က				3.60	10.20	5.93	3.70	0.62
DISSOLVED-METALS	LEAD	µg/L	500	တ	16	16	1.00			1.20	5.80	3.15	1.26	0,40
DISSOLVED-METALS	LEAD	µg/L	201	ဟ	6	18	0.50	1.00	2.20	2.10	10.20	2.65	2.61	0.99
DISSOLVED-METALS	LEAD	hg/L	202	s	12	13	0.92	1.90		2.10	11.40	4.20	2.72	0.65
DISSOLVED-METALS	LEAD	µg/L	BM-CR	Ф		33		1.00			14.00			
TOTAL-METALS	LEAD	ηg/L	BM-LK	80		125				1.00	888.00	2.75-86		
TOTAL-METALS	LEAD	μg/L	BGCR	æ	52	131	0.40	0.70	11.60	0.80	21.00	1.94	2.32	1.20
TOTAL-METALS	LEAD	µg/L	CREEK	တ	8	6 0	1.00			0.90	11.00	7.89	3.81	0.48

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EG&G ROCKY FLATS ENVIRONMENTAL TECHNOLOGY SITE CDPHE Conservative Screen for Operable Unit 3

CDPHE Conservative Screen for Operable Unit 3										Section:			4.0	Appendix B
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						1	TABLE B-3							
					COMPARIS	SON TO BENCH	COMPARISON TO BENCHMARK DATA-SURFACE WATER	IRFACE WATER						
					Number of	Number of	Frequency of	Minimum	Maximum Nondetected	Minimum Detected	Maximum Detected		i	Coefficient of
Main Test Group Code	Chemical Name	New Unit	Data Source	Area	Detects	Samples	Detection	Nondetected Value	Value	value	Value	Mean*	Deviation	Variation
NOTE:	0				(To)									
DM-CAT EDENCHMEN STREAM VANCE (FISISION CREAK), CORG CAMBI, PARTIES BIGNING CARB (AVXCA, 1994))	Values (Haiston Creek	Croke canal,	armers mignine	Canal (Ar	dada, 1994)) oko end Herri	man I also / Amin	4004 EDA 4	000 and 1004))						
DM-LA - Denchmark Lakes/	teservoir values (unam	iela Heservoir,	onerry creek, pe	ar Creek L	ake, and nain	man Lake (Arva	ida, 1984; EriA, 1	ass and result		0		101	9	
IOIAL-MEIALS	LEAD	hg/L	200	o o	2 !	<u> </u>	9.5	•	i d	0.50		40.7	9,4,0	50.0
TOTAL-METALS	LEAD	hg/L	201	so ·	17	22	0.85	2.00	2.70	2.50		4.34	57.89	0.67
TOTAL-METALS	LEAD	hg/L	202	တ	13	13	1.00			2.40	37.20	7.22	9.78	1.35
DISSOI VED-METALS	MIHEL	j/uii	BGCB	œ	5	118	0.43	1.00	101.00	1.30	12.80	15.97	20.53	1.29
DISSOI VED-METALS	ITHIIW	1/011	CRFFK	ď	, e.		100			5.80	•	7.90	3.55	0.45
DISSOLVED METALS	WIELE I	1/01		ď	, ŧ	, L	760	3.70	3.70	3.80		5.58	1.52	0.27
DISSOLVED METALS	WILLE)))	2 5	ď	<u> </u>	2 4	5.5	5	5	5.90	•	7.65	1 41	0 18
DISSOLVED-METALS	TITLI W	, join	202	טכ	5 4	5 <u>\$</u>	8.5			6.50		60.00	135	5 5
TOTAL METALO	LITTION	100r	202	0 0	2 5	5. 4.06	2.5	5	50	5000		1 76	17.28	
TOTAL MITTALS		т <u>е</u>	מלום ל	۵ د	1 0	1 20	4.0.4	8.3	8.99	8.5		7.40	05.71	96.0
TOTAL METALS	MOIHIC	J. 61	CHEEK	n c	- 9	- 9	8.5			00.0		04.7	4.04	4.C.O.
IOIAL-MEIALS	WOLL I	797	8 3	0 (<u>o</u> ;	2 €	90.			3:30	•	5 6	2 5	3.0
TOTAL-METALS	LITHIUM	тод Т	501	o o	ล :	2 :	9.5			4.90		1.72	 	0.21
IOIAL-METALS	LITHIUM	₽Ø/L	202	တ	5	2	9.5			5.20	9.40	67:/	8 8	ê. O
TOTAL-METALS	LITHIUM	µ9/L	BM-LK	æ		9					8.00	4.38		
DISSOLVED-METALS	MAGNESIUM	1/0/1	BGCR	60	133	149	0.89	3300.00	5000.00	1890.00	17800.00	5004.04	1987.74	0.40
DISSOLVED-METALS	MAGNESIUM	no/l	CREEK	Ø	e		1.00			3080.00	6310,00	4303.33	1751.69	0.41
DISSOLVED-METALS	MAGNESIUM	761	200	ဟ	16	16	1.00			3080.00	4320.00	3941.88	273.31	0.07
DISSOLVED-METALS	MAGNESIUM	J/6rl	201	တ	18	₽	1.00			3520.00		5331,11	546.30	0.10
DISSOLVED-METALS	MAGNESIUM	µ9∕L	202	တ	13	13	1.8			5930.00		6627.69	452.59	0.07
DISSOLVED-METALS	MAGNESIUM	µg/L	BM-LK	æ		88					66000.00	8760.00		
TOTAL-METALS	MAGNESIOM	µg/L	BGCR	80	134	146	0.92	4100.00	5000.00	1870.00	16600.00	5125.31	1924.26	0.38
TOTAL-METALS	MAGNESIOM	1/6rl	CREEK	Ø	80	80	1.00			2940.00	11100.00	5297.50	2771.48	0.52
TOTAL-METALS	MAGNESIOM	rg/L	500	တ	19	9	1.00			2940.00	11100.00	4328.42	1689.44	0.39
TOTAL-METALS	MAGNESIUM	rg/L	201	တ	8	8	1.00			3450.00	6480.00	5338.00	596.74	0.11
TOTAL-METALS	MAGNESIUM	rg/L	202	တ	13	13	1.00			5820.00		6568.46	586.74	0.09
TOTAL-METALS	MAGNESIUM	µg/L	BM-LK	60		86					27000.00	9400-17600		
DISSOLVED-METALS	MANGANESE	µg/L	BGCR	æ	115	148	0.78	0.94	15.00	1.00	()	28.47	47.75	1,68
DISSOLVED-METALS	MANGANESE	ng/L	CREEK	တ	ဗ	ო	4.00			4.80	63.10	42.00	32.31	0.77
DISSOLVED-METALS	MANGANESE	rg/L	500	တ	16	16	1.00			0.90	94.20	19.01	31.20	1.64
DISSOLVED-METALS	MANGANESE	ng/L	201	တ	4	48	0.78	0.90	06'0	1.60	1570.00	118.88	372.43	3.13
DISSOLVED-METALS	MANGANESE	ng/L	202	တ	5	5	1.00			2.70	7.90	4.85	1.73	0.36
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EG&G ROCKY FLATS ENVIRONMENTAL TECHNOLOGY SITE CDPHE Conservative Screen for Operable Unit 3	RONMENTAL TECHNOLO	OGY SITE							0, 1	Section:			•	Appendix B
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						Ţ	TABLE B-3							
					COMPAR	SON TO BENCH	COMPARISON TO BENCHMARK DATA-SURFACE WATER	RFACE WATER				i		
					Number of	Number of	Frequency of	Minimum	Maximum Nondetected	Minimum Detected	Maximum Detected		ll	Coefficient of
Main Test Group Code	Chemical Name	New Unit	Data Source	Area	Detects	Samples	Detection	Nondetected Value	Value	value	Value	Mean*	Deviation	Variation
NO I E. BM-CR = Benchmark Stream Values (Raiston Creek, Croke Canal, Farmer's Highline canal (Arvada, 1994))	m Values (Raiston Creek	Croke Canal. I	Farmer's Highline	anal (An	/ada. (994))									
BM-LK = Benchmark Lakes/Reservoir Values (Chatfield Reservoir, Cherry Creek, Bear Creek	Reservoir Values (Chati	feld Reservoir,	Cherry Creek, Bea	r Creek L	ake, and Harri	man Lake (Arva	Lake, and Harriman Lake (Arvada, 1994; EPA, 1993 and 1994))	93 and 1994))						
DISSOLVED-METALS	MANGANESE	Hg/L	BM-CR	ø		, 8		5.00			1800.00			
DISSOLVED-METALS	MANGANESE	µ9/L	BM-LK	80		8					31.00			
TOTAL-METALS	MANGANESE	µg/L	BM-LK	<u>m</u>		197					400.00	43.22-216.5		
TOTAL-METALS	MANGANESE	µg/L	BGCR	8	138	151	0.91	1.30	15.00	1.00	4060.00	70.78	343.53	3.95
TOTAL-METALS	MANGANESE	µg/L	CREEK	S	80	80	1.00			97.00	307.00	169.00	70.21	
TOTAL-METALS	MANGANESE	hg/L	200	Ø	19	19	1.00			6,80	210.00	71.51	66.18	0.93
TOTAL-METALS	MANGANESE	hg/L	201	တ	20	8	1.00			5.50	1580.00	155.99	357.73	2.29
TOTAL-METALS	MANGANESE	µg/L	202	S	13	13	1.00			11.80	37.00	21.96	8.28	0.38
TOTAL-METALS	MANGANESE	hg/L	BM-CR	m		88		5.00			1800.00			
DISSOLVED-METALS	MERCURY	µg/L	BGCR	m	80	88	0.10	0.10	0.20	0.22	0.44	0.12	0.07	0.50
DISSOLVED-METALS	MERCURY	ng/L	CREEK	Ø		m		0.20	0.20	,	5	3 0	200	600
DISSOLVED-METALS	MERCURY	rg/L	200	S	ເດ	16	0.31	0.20	0.20	0.13	0.13	0.11	0.01	0.13
DISSOLVED-METALS	MERCURY	hg∕L	201	S		18		0.10	0.20			0.09	0.02	0.27
DISSOLVED-METALS	MERCURY	J/6/L	202	S	2	13	0.15	0.10	0.20	0.20	0.20	0.10	0.05	0.54
DISSOLVED-METALS	MERCURY	µg/L	BM-CR	œ		8		0.10			0.20			
TOTAL-METALS	MERCURY	µg/L	BM-LK	60		112		0.10			8.00	0.05-0.36		
TOTAL-METALS	MERCURY	μg∕ľ.	BGCR	œ	6	122	0.07	0.10	0.42	0.20	1.40	0.13	0.16	1.21
TOTAL-METALS	MERCURY	rig/L	CREEK	တ	CI.	æ ;	0.25	0.20	0.20	0.12	0.12	0.11	0.01	60'0
TOTAL METALS	MERCORY	hg/L	200	n c	•	2	,	0.10	0.20			0.09	0.05	0.26
TOTAL METALS	MED COT	10°C	500	n u	90	S \$	er.0	0.10	0.20	0.12	0.82	0.13	0.16	1.28
וסושרישורוטרס	T COCUM	hy.	202	0	V	2	G	0.10	0.20	0.20	0.30	0.10	0.07	0.69
DISSOLVED-METALS	MOLYBDENUM	µg/L	BGCR	₩.	14	92	0.15	2:00	500.00	2.50	23.40	33.19	49.35	1.49
DISSOLVED-METALS	MOLYBDENUM	hg/L	CREEK	တ	၈	က	1.00			3.40	6.60	4.77	1.65	0.35
DISSOLVED-METALS	MOLYBDENUM	µg/L	200	တ	16	16	1.00			2.00	7.00	4.64	1.49	0.32
DISSOLVED-METALS	MOLYBDENUM	hg/L	201	S	18	18	1.00			2.70	8.80	5.17	1.44	0.28
DISSOLVED-METALS	MOLYBDENUM	µg/L	202	တ	63	13	0.15	1.70	2.70	2.70	3.10	1.36	0.73	0.54
TOTAL-METALS	MOLYBDENUM	µg∕L	BGCR	œ	12	125	0.10	2.00	100.00	2.10	20.30	12.13	17.41	1.44
TOTAL-METALS	MOLYBDENUM	иg/L	CREEK	တ	9	80	0.75	3.50	3.50	3.50	7.40	4.53	2.07	0.46
TOTAL-METALS	MOLYBDENUM	ng/L	200	ဟ	11	19	0.89	3.50	3.50	3.60	8.20	5.08	1.61	0.32
TOTAL-METALS	MOLYBDENUM	hg/L	201	Ø	82	20	1.00			3.30	7.70	5.29	1.35	0.25
TOTAL-METALS	MOLYBDENUM	µg/L	202	Ø	ι¢	13	0.38	1.70	2.70	1.90	4.40	1.78	1.00	0.56
TOTAL-METALS	MOLYBDENUM	μg/L	BM-LK	6		20					60.00	8.35		

EG&G ROCKY FLATS ENVIRONMENTAL TECHNOLOGY SITE CDPHE Conservative Screen for Operable Unit 3

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TABLE B-3 COMPARISON TO BENCHMARK DATA-SURFACE WATER

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Main Test Group Code	Chemical Name	New Unit	New Unit Data Source Area	Area	Number of Detects	Number of Samples	Frequency of Detection	Minimum Nondetected Value	Maximum Nondetected Value	Minimum Detected value	Maximum Detected Value	Mean*	Standard Deviation	Coefficient of Variation
NOTE: BM-CR = Benchmark Stream Values (Raiston Creek, Croke Canal, Farmer's Highline canal (Al BM-LK = Benchmark Lakes/Reservoir Values (Chatfield Reservoir, Cherry Creek, Bear Creek	ım Values (Raiston Creek, s/Reservoir Values (Chatfi	, Croke Canal, F ield Reservoir, (⁻ armer's Highline (Cherry Creek, Bea	canal (Arve ir Creek Lai	vada, 1994)) _ake, and Harrim	nan Lake (Arve	veda, 1994)) Lake, and Harriman Lake (Arvada, 1994; EPA, 1993 and 1994))	993 and 1994))						
DISSOLVED-METALS	NICKEL	µg/L	BGCR	60	4	98	0.05	300	40 DO	000	04 60	7	ų.	į
DISSOLVED-METALS	NICKEL	hg/L	CREEK	တ	0	9	0.00	00.9	9.9	0.40	00.12	14.7	5.58	0.75
DISSOLVED-METALS	NICKEL	ng/L	200	တ	-	16	90.0		88	3 50	3 60	9.6	ć	4
DISSOLVED-METALS	NICKEL	µg/L	201	တ	ဧ	18	0.17	2.60	6.00	2.80	3.40	2.10	0.92	24.0
DISSOLVED-METALS	NICKEL	µg/L	202	တ	Ø	13	0.15	٠	6.00	2.90	6.60	2.48	5.5	\$ C
DISSOLVED-METALS	NICKEL	Hg/L	BM-CH	æ		34		10.00			20.00	į	20:	8
DISSOLVED-METALS	NCKEL	µg/L	BM-LK	œ		20					10.00			
TOTAL-METALS	NICKEL	µg/L	BM-LK	œ		123		10.00			25.00	30.63		
TOTAL-METALS	NICKEL	µg/L	BGCR	DD.	15	120	0.13	3.00	40.00	3.80	12.80	7.11	5.88	0.83
TOTAL-METALS	NICKEL	µg/L	CREEK	s	-	80	0.13	2.60	11.20	2.80	2,80	3.74	1.64	95.0
TOTAL-MEIALS	NICKEL	hg/L	200	တ	9	19	0.32	2.60	11.20	2.70	6.50	3.32	1.59	0.48
TOTAL-METALS	NICKEL	µg/L	201	Ø	យ	50	0.25	2.60	00:9	2.80	33.10	4.18	68.8	1.65
OTAL-METALS	NICKEL	h9/L	202	တ	4	13	0.31	2.60	6.00	2.80	23.00	4.56	6,02	1.32
DISSOLVED-METALS	PHOSPHORUS	ng/L	BGCR	60	4	9	0.67	80,00	296.00	102.00	398 00	163 50	100 37	27.0
TOTAL-METALS	PHOSPHORUS	hg/L	BGCR	6 0	-	9	0.17	101.00	456.00	157.00	157.00	110.49	20.00	0.00
									2	20.70	8.5	74:011	06.90	0.62
DISSOLVED-METALS	POTASSIUM	1/6rl	BGCR	m	98	125	69'0	390.00	2000:00	402.00	00.0089	1612.34	1011.90	0.63
DISSOLVED-METALS	POTASSIUM	1/6rl	CREEK	တ	ဗ	ဗ	1.00			1130.00	2170.00	1626.67	52157	999
DISSOLVED-METALS	POTASSIUM	1/6/I	500	Ø	16	16	1.00			1130.00	2030 00	1559 3B	181 38	200
DISSOLVED-METALS	POTASSIUM	µg/L	201	တ	18	48	1.00			1580.00	2170.00	1858.33	122 A7	0.07
DISSOLVED-METALS	POTASSIUM	µg/L	202	တ	13	13	1.00			141.00	640.00	412.77	202 77	0.0
TOTAL-METALS	POTASSIUM	hg/L	BGCR	8	93	128	0.73	380.00	5000.00	493,00	6700.00	1817.03	1058.86	0.58
TOTAL-METALS	POTASSIUM	hg/L	CREEK	s	80	80	1.00			1260.00	6390,00	2611.25	1621.01	0.62
IOIAL-METALS	POTASSIUM	76r	500	S	19	19	1.00			1340.00	6390.00	2051.05	1105.88	480
TOTAL-METALS	POTASSIUM	J/6rl	201	တ	20	20	1.00			1260.00	2370.00	1913.50	235.85	45.0
TOTAL-METALS	POTASSIUM	µg/L	202	S	43	13	1.00			147.00	740.00	420.34	244 72	2 5
TOTAL-METALS	POTASSIUM	hg/L	BM-LK	В		38				2	11000.00	2150-6900	7/:17	OC:O
DISSOLVED-METALS	SELENIUM	ng/L	ВССВ	8	7	8	0.08	0.80	20.00	0.85	860	+	4 73	
DISSOLVED-METALS	SELENIUM	µg/L	CREEK	တ	_	ო	0.33	3.70	3.70	08.6	90.6	0 67.0	7/:/	5,03
DISSOLVED-METALS	SELENIUM	µg/L	200	တ		16		2.90	3.80		ì	7.7	0.00	0.47
DISSOLVED-METALS	SELENIUM	μg/L	201	တ	8	48	0.17	2.80	3.90	3.00	3.90	2.05	0.75	0.37

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Appendix B 31 of 40		Coefficient of	Variation		,	0.26			0.93	0.58	0.34	0.38	5	0.55	0.45	0.42	0.78	0.56	0.85	0.54	0.82		0.99	0.75	20.0	12.0	•								;		
Appe 31 ol		Ctandard Co	- 1			0.43			1.19	0.77	0.50	0.77	0.20	782.73	1166.63	619.80	1154.47	3377.17	2484.62	02.1012	1107.18		2.72	1.53	0.65	0.32	6.50		4	0.33	20.00	ة د					
		ě	Mean⁴ De			1.64			1.27	1.33	1.47	2.06	1.66	90 044	1413.00	1459.33	1476.69	6076.23	4097.25	2469.89	1636.95	23:02:	2.75	2.03	2.04	1,38	1.55		•	2.49	1,26	1.44	1.55	3	17045.66		
		Maximum	Detected			3.00		1	2.00	0.60		5.30			3100.00	3390.00	3330.00	15200.00	7770.00	7770.00	4040.00	3250.00	0 0	3.80	3.80			9009	3.00						44700.00		
ion: 3:		Minimum Me		value		3.00			;	0.80		08.3			469.00	1240.00	865.00	410.00	928.00	544.00	928.00	348.00	0	08.5	250					2.10					4190.00		
Section: Page:		Maximum Mi	Ð	Value		OB C	3.00			20.00	3.90	3.80	5.5 CB C	9.0										30.00	2.30	3.60	9.60	3		10.00	3.60	3.60	3.60	3.60	17100.00		
		Max				;	2:30	9.50	9.1	08.0	0.80	0.80	2.80	2.90										2.00	2.30	2.30	25.30	2.30	0.10	5.6	8 6	2.10	2.30	2.30	17100 00		
	ACE WATER	COMPARISON TO BENCHMARK DAIA-SON TO BENCHMARK	Minimum	Nondetected Value		33 and 1994))																			•	_					8	Q				0.88	
	B-3	K DA I A-SUN	10,000			1994; EPA, 199	0.08			900	000		0.05			8.5	3 5	8.5	1.00	1.00	1.00	3.6	3:	0.0	0.33	0.31					0.12	0.00				Ö	
	TABLE B-3	D BENCHMAR		Number of Fre		ake (Arvada.	13 13	16	18	103	021	o q	2 8	5 5		16	က	φ ξ	67	, æ	19	50	13	ĕ	g et	16	14	13	34	114	116	æ	19	16 5	2	152	
		PARISON TO	ı		1	94))		-			7	0	•	-		16	3	18	5 5	òœ	6	8	5	•	on •	- v	,				14	0				151	
				Ζ,	Area Detects	nal (Arvada, 19	reek Lake, an	o a	a 60	60	8	S	တ	o u	0	S	s	Ø	တ	m c	ກປ	o	တ		a	o (vo (o o	n c	ם מ	ם מ	n o) (r	တ	တ	Ø	ı
		•			Data Source	ner's Highline ca	erry Creek, Bear (202	BM-CH	HM-LK	BGCR	CREEK	200	201	202	50	CBEFIX	201	202	BGCR	CREEK	8 8	202	}	BGCR	CREEK	500	201	202	BM-CR	BM-LK	BGCR	CHEEN	20.20	202	ROCE	
SITE					New Unit	roke Canal, Fari	d Reservoir, Ch	µg/L	µg/L	µ9/L	194.	, joi	/01	rg/L	1/61	٠	hg/L	ug/L	1,01	J/6rl	1/6d	hg/L	µg/L	hgr	130/).	rg/L	ng/L	1/6rl	ng/L	hg/L	1/6/1	1/6rl	µg/L	1/6rl	1/6rl		µg/L
MENTAL TECHNOLOGY					Chemical Name	O year O mater	/atues (Haiston Creek, o	SEI FNIUM	SELENIUM	SELENIUM	SELENIUM	SELENIUM	SELENIUM	SELENIUM	SELENIUM		SILICON	SILICON	SILICON	SILICON	SILICON	SILICON	SILICON	SILICON		SILVER	SILVER	SILVER	SILVER	SILVER	SILVED	SILVER	SILVER	SILVER	SILVER		SODIUM
EG&G ROCKY FLATS ENVIRONMENTAL TECHNOLOGY SITE COPPLE CONSERVATIVE Screen	Non-Controlled Document				Main Test Group Code	NOTE: NOTE: 1994)	CR = Benchmark Stream	LK = Benchmark Lakes/H	DISSOLVED-METALS	DISSOLVED METALS	TOTAL METALS	TOTAL-METALS	TOTAL-METALS	TOTAL-METALS	TOTAL-METALS	TOTAL-METALS	S.METALS	DISSOLVED-METALS	DISSOLVED-METALS	DISSOLVED-METALS	TOTAL-METALS	TOTAL-METALS	TOTAL METALS	TOTAL-METALS		DISSOLVED-METALS	DISSOLVED-METALS	DISSOLVED-METALS	DISSOLVED-METALS	DISSOLVED-METALS	DISSOLVED-METALS	TOTAL-METALS	TOTAL-METALS	TOTAL-METALS	TOTAL-METALS	TOTAL-METALS	DISSOLVED-METALS

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TABLE B-3 COMPARISON TO BENCHMARK DATA-SURFACE WATER

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Section: Page:

Main Test Group Code	Chemical Name	New Unit	Data Source	Area	Number of	Number of	Frequency of	Minimum	Maximum Nondetected	Minimum Detected	Maximum Detected		Standard	indard Coefficient of
NOTE:						campias	Delection	Nondetected Value	value	value	Value	Mean	Deviation	Variation
BM-CR = Benchmark Stream Values (Ralston Creek, Croke Canal, Farmer's Highline canal (Arvada, 1994))	n Values (Raiston Creek,	Croke Canal, F.	armer's Highline	anal (Arv	ada, 1994))									
BM-LK = Benchmark Lakes/Reservoir Values (Chatfield Reservoir, Cherry Creek, Bear Creek Lake, and Harriman Lake (Arvada, 1994; EPA, 1993 and 1994))	/Reservoir Values (Chatfie	Id Reservoir, C	Cherry Creek, Bea	r Creek Le	ike, and Harrin	าลก Lake (Arvย	ida, 1994; EPA, 19	93 and 1994))						
DISSOLVED-METALS	SODIUM	µg/L	CREEK	s	6	,	1.00	<i>"</i>		6370.00	1430000	70 0400	101101	
DISSOLVED-METALS	SODIUM	µg/L	500	S	16	16	1.00			5370.00	8610.00	70800	4047.05	0.52
DISSOLVED-METALS	SODIUM	µg/L	201	တ	18	18	1.00			2270.00	14200.00	11770 56	145.48	6.0
DISSOLVED-METALS	SODIUM	µg/L	202	s	13	5	50			22.00	2000000	00.07711	1350.77	
TOTAL-METALS	SODIUM	1/6rl	BGCR	6	154	155	0.99	2000 00	500000	3700.00	45400.00	29/61.54	1875.07	0.06
TOTAL-METALS	SODIUM	no/L	CREEK	Ø	60	α	5		00000	4640.00	40000	10006.90	/0.00e/	0.45
TOTAL-METALS	SODIUM	1,67	200	S	91	19	8 -			4610.00	40000.00	12688.00	11709.00	0.92
TOTAL-METALS	SODIUM	µg/L	201	s	50	50	1.00			6940.00	415000,00	9351.05	7531.34	0.81
TOTAL-METALS	SODIUM	ng/L	202	S	13	13	1.00			00.000	31300.00	00.71000	90201.38	2.84
TOTAL-METALS	SODIUM	µg/L	BM-LK	В		36				00000	54000.00	12600-54000	1494.52	0.05
DISSOLVED-METALS	STRONTIUM	µg/L	BGCR	æ	112	138	0.81	100.00	100000	20 00	730 00	0000		į
DISSOLVED-METALS	STRONTIUM	hg/L	CREEK	Ø	6	9 60	00	0000	0.000	08.80	438.00	190.86	145.58	0.76
DISSOLVED-METALS	STRONTIUM	ng/L	200	S	16	¥	2 2			90.50	143.00	129.07	51.98	0.40
DISSOLVED-METALS	STRONTIUM	1/6/	201	S	18	2 2	1.00			100.00	180.00	130.45	13.03	0.10
DISSOLVED-METALS	STRONTIUM	ug/L	202	s	13	. 13	00.			14.00	137.00	23.00	0.90	0.00
TOTAL-METALS	STRONTIUM	ng/L	BGCR	60	117	135	0.87	00 001	10000	37.40	97.60	124.62	7.54	90:0
TOTAL-METALS	STRONTIUM	ng/L	CREEK	တ	80	60	8		2000	27.40	90.00	16.771	30.50	0.74
TOTAL-METALS	STRONTIUM	1/6rl	200	S	19	5	5			77.00	306.00	150.61	77.86	0.52
TOTAL-METALS	STRONTIUM	J/6rt	201	တ	50	2 2	8			06.47	300.00	135.66	45.80	0.34
TOTAL-METALS	STRONTIUM	ng/L	202	ဟ	13	13	5			96.40	200.00	157.42	17.74	0.11
TOTAL-METALS	STRONTIUM	hg/L	BM-LK	8		16	3			8.4	456.00	122.69 248.94	6.01	0.05
DISSOLVED-METALS	THALLIUM	µg/L	BGCR	æ	8	97	0.00	G	5	+	+		,	į
DISSOLVED-METALS	THALLIUM	ng/L	CREEK	S	0		000	000	86	3	7.	50.1	1.48	0.80
DISSOLVED-METALS	THALLIUM	ng/L	200	S		16		080	0.30			0.45	,	
DISSOLVED-METALS	THALLIUM	ng/L	201	တ		18		06.0	5.5			1.62	0.48	0.26
DISSOLVED-METALS	THALLIUM	ng/L	202	s	,	5		080	8 4			1 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5	0.12	91.0
TOTAL-METALS	THALLIUM	1/6r/	BGCR	æ	ო	124	0.02	06.0	4,30	60	9	91.1	0.69	0.60
TOTAL-METALS	THALLIUM	hg/L	CREEK	S	0	60	0.00	06:0	180	3	0.40	1.08	2.15	1.28
TOTAL-METALS	THALLIUM	µg/L	200	s		19		06:0	4.30			6.0	0.21	0.31
TOTAL-METALS	THALLIUM	hg/L	201	S		50		0.90	1.60			0.00	0.36	0.33
TOTAL-METALS	THALLIUM	µg/L	202	တ		13		06'0	4.50			123	22.0	0.70
IOIAL-METALS	THALLIUM	76r	BM-LK	ω		18					12.00	2	3	0.02

EG&G ROCKY FLATS ENVIRONMENTAL TECHNOLOGY SITE	HONMENTAL TECHNOL	OGY SITE												
CDPHE Conservative Screen for Operable Unit 3	_									Section:			4,0	Appendix B
Non-Controlled Document										- aña:	į		'	0+10.00
						Į.	TABLE B-3		!	!		:		
					COMPARIS	SON TO BENCH	COMPARISON TO BENCHMARK DATA-SURFACE WATER	RFACE WATER			ļ			
					Number of	Number of	Frequency of	Minimum	Maximum Nondetected	Minimum Detected	Maximum Detected		U	Coefficient of
Main Test Group Code	Chemical Name	New Unit	Data Source	Area	Detects	Samples	Detection	Nondetected Value	Value	value	Value	Mean*	Deviation	Variation
NOTE: Dis CD - Banatanad Statem Maline (Beletan Cont. Cant. Canal Economic Ulabilina senal (Amade 1904))	Jan's makeledy and all a	T land Carlon of	Sounds Mobiles	, and / Am	100A))									
BM-LH ≤ Benchman Sitean Values (hatson deen, blone centar, farins s nigninio centar, 1994). BM-LK ≤ Benchmark Lakes/Reservoir Values (Chatfield Reservoir, Cherry Creek, Bear Creek Lake, and Harriman Lake (Arvada, 1994; EPA, 1993 and 1994).	m values (naiston offer /Reservoir Values (Chat	ffield Reservoir,	Cherry Creek, Be	ar Creek La	ada, 1994)) ike, and Harrir	nan Lake (Arva	da, 1994; EPA, 19	193 and 1994))						
DISSOLVED METALS	NI	"	acea	α	ţ	Š	0.17	08 6	136.00	10.80	72 40	27 74	21.15	97.0
DISSOLVED-METALS	2	yon	CHFFK	o.	: c		800	12.50	12.50		e i	6.25) : :	5
DISSOLVED-METALS	Z	no/L	500	တ	•	16		6.20	12.50			4.48	1.61	0.36
DISSOLVED-METALS	Z.	ng/L	201	တ	S	17	0.29	6.20	12.50	6.30	13.70	7.01	3.09	0.44
DISSOLVED-METALS	NIT	rg/L	202	တ	-	13	0.08	6.20	12.50		8.10	4.70	1.86	0.40
TOTAL-METALS	N.	hg/L	BGCR	80	18	118	0.15	7.00	136.00	11.00	180.00	19.61	22.01	1.12
TOTAL-METALS	NI	μg/L	CREEK	တ	0	80	0.00	6.20	12.50			4.88	1.31	0.27
TOTAL-METALS	NE.	hg∕L	500	Ø	Ø	19	0.16	6.20	12.50	7.00	9.70	5.41	2.08	0.38
TOTAL-METALS	AI.	µg/L	201	တ		50		6.20	12.50			4.52	1.61	96.0
TOTAL-METALS	NIL	µg∕L	202	တ	-	13	0.08	6,20	12.50	6.50	6.50	4.57	1.66	0.36
DISSOLVED-METALS	VANADIUM	µg/L	BGCR	62	13	106	0.12	2.00	50.00	2.00	12.10	4.20	5.55	1.32
DISSOLVED-METALS	VANADIUM	µg/L	CREEK	တ	0	၈	0.00	3.30	3.30			1.65	0.00	0.00
DISSOLVED-METALS	VANADIUM	µg∕L	200	တ	α ι	16	0.13	2.50	3.30	2.70	3.40	1.65	0.59	0.36
DISSOLVED-METALS	VANADIUM	µg/L	201	တ		18		2.50	3.30			1.45	0.21	0.14
DISSOLVED-METALS	VANADIUM	hg/L	202	s i	ဖ	± 13	0.46	2.50	3.30		6.10	2.76	1.59	0.58
TOTAL-METALS	VANADIUM	µg/L	BGCR	ω (33	120	0.28	2.00	90.09	2.00	18.20	6.64	8.22	1.24
TOTAL-METALS	VANADIUM	µg/L	CHEEK	တ	or é	σ (0.25	2.50	3.50	3.80	4.80	2.29	1.28	0.56
TOTAL-METALS	VANADIOM	100r	8 50	nα	2 +	2 5	0.53	2.50	9.50 0.50 0.50	3.80	90.8	3.15	2.08	0.00
TOTAL-METALS	VANADIUM	rg/L	505	တ	- φ	£ £	0.46	2.50	3.30	2.50	6.40	2.60	1.56	0.60
DISSOLVED-METALS	ZINC	no/L	вася	æ	98	138	0.62	1.70	44.00	2.40	111.50	14.08	18.21	1.29
DISSOLVED-METALS	ZINC	1/6rl	CREEK	တ	က	က	1.00			13.30	44.90	28.00	15.91	0.57
DISSOLVED-METALS	ZINC	hg/L	500	တ	60	16	0.50	5.70	10.10	5.80	30.40	10.63	9.35	0.88
DISSOLVED-METALS	ZINC	µg/L	201	တ	12	18	0.67	5.70	10.10	7.00	44.90	11.74	9.49	0.81
DISSOLVED-METALS	ZINC	µg/L	202	s	80	13	0.62	5.70	10.10	5.70	143.00	18.46	37.80	2.05
DISSOLVED-METALS	ZINC	hg/L	BM-CH	co 1		34		5.00			670.00			
DISSOLVED-METALS	ZINC	μg/L	BM-LK	m o		2,50				7	20,02	16 40 07		
TOTAL METALS	ZINC	hg/r	ם מון-רצ	0 0	Ť	† Y	000	, ,	07 09		98,00	12-04-03	9	*
TOTAL-METALS	ZINC	1/8d	BGCH	ט מ	401	101	89.5 F	Dr	90.40	08. nt	480.00	32./4	62.29	1.90
TOTAL METALS	ZINC	194 197	CHEEK	nα	æ ç	φ	3 5			3.01	158.00	91.30	08'08	0.00
וסואריויוביארס	7117	hg/L	3	oʻ.	<u> </u>	2	20.			3	20002	DE-10#	¥.	5

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EG&G ROCKY FLATS ENVIRONMENTAL TECHNOLOGY SITE CDPHE Conservative Screen for Operable Unit 3

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TABLE B-3 COMPARISON TO BENCHMARK DATA-SURFACE WATER

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Section: Page:

Main Test Group Code	Chemical Name	New Unit	Oata Source	Area	Number of	Number of	Frequency of	Minimum	Maximum Nondetected	Minimum Detected	Maximum			
NOTE:				3	Detects	Samples	Detection	Nondetected Value	Value	value	Value	Mann	Standard	Coefficient of
BM-CR = Benchmark Stream Values (Raiston Creek, Croke Canal, Farmer's Highline canal (Ar	Values (Raiston Creek,	Croke Canal, I	Farmer's Highline	canal (A	rvada, 1994))								Deviation	Variation
TOTAL—Erans Lakes/reservoir Values (Chaffield Reservoir, Cherry Creek, Bear Creek Lake, and Harriman Lake (Arvada, 1994; EPA, 1983 and 1994).	Teservoir Values (Chatfie	eld Reservoir,	Cherry Creek, Bea	ır Creek	Lake, and Harri	nan Lake (Arva	da, 1994: EPA. 19	93 and 1994))						
TOTAL-METALS	ZINC	ng/L	201	တ	11	202	0.85	10 10						
1		hg/L	202	တ	7	13	0.54	07.5	0.00	12.80	_	38.60	47.49	1.23
RADIONUCLIDES									2	09.0	18.00	8.18	5.49	29.0
DISSOLVED-RADS	AMERICIUM-241	DCM	acca	٥	;									
DISSOLVED-RADS	AMERICIUM-241	PCIL	CRFFK	0 c	*	8 '	1.80			-0.010	0.500	020	0,00	
DISSOLVED-RADS	AMERICIUM-241	PCIA	200	o o	n *	m ;	1.00			-0.002	0.003	0.070	0.129	.83
DISSOLVED-RADS	AMERICIUM-241	PCIL	201	o co	7	4 ;	8.5			-0.003	0.018	0000	0.003	3.77
DISSOLVED-RADS	AMERICIUM-241	PCIA	202	o on	* ¢	4 ;	1.00			-0.004	0.013	0.003	0.003	1.56
TOTAL PADS	AMERICIUM-241	PCi/L	BGCR	œ	i 5	2 5	8.5			-0.019	0.116	0.013	0.00	85.1 CB C
TOTAL-HADS	AMERICIUM-241	pCi/L	BM-LK	a	2	8 8	36.			-0.021	0.038	0.004	0000	7.02
TOTAL-HADS	AMERICIUM-241	pCi/L	CREEK	Ø	ic.	9 4	•				0.117	(-)0.013-0.019		26:-
TOTAL-HADS	AMERICIUM-241	pCi/L	200	တ	9	ი 4	8: 5			-0.001	2000	0.004	0.003	0.78
TOTAL DADS	AMERICIOM-241	PCi/L	201	S	12	, ,	3 5			-0.005	0.017	0.002	0.005	? ?
COLLINDS	AMERICIUM-241	РСИ	202	Ŋ	12	12	8.5			-0.001	0.026	0.006	0.007	2 2
DISSOLVED BADS						!	8			0.000	0.017	9000	0.002	0.86
DISSOI VED-BADS	GHOSS ALPHA	PCiA	BGCR	œ	9	9	8							
DISSOLVED-RADS	GEOGE ALPHA	PCIV	500	S	16	16	9			-1.380	5.000	0.687	1.123	1.63
DISSOLVED-RADS	GROSS ALPHA	pcy.	201	တ	15	15	100			-0.420	2.700	0.485	0.716	1.48
TOTAL-BADS	GROSS ALPHA	pcir	202	တ	12	12	200			-0.580	1.400	0.782	0.473	0.60
TOTAL-BADS	GROSS ALPHA	PCIV	BGCH	m	82	82	2			-0.130	1.900	0.496	0.545	1.10
TOTAL-BADS	GHOSS ALPHA	PCIL	200	Ø	15	5	8 5			-5.000	13.000	1.513	2.238	1.48
TOTAL-BADS	GROSS ALPHA	DCM.	201	Ø	15	15	9			0.072	2.200	1.124	0.727	0.65
	GROSS ALPHA	PCM	202	s	Ξ	Ξ	18			0.440	1.900	1.178	0.489	0.41
DISSOLVED-RADS	GROSS BETA	50	000	•			}			-0.250	1.200	0.520	0.445	0.86
DISSOLVED-RADS	GROSS BETA	DCK.	H OC	2 2 0	61	61	1.00			-0.676	41 820	1007	;	
	GROSS BETA	5	2 6	9 (2	16	1.00			080	200	4:00/	0.777	1.45
MDS	GROSS BETA	DCW.	202	n o	15	15	1.00			-0.140	4 300	1.621	0.831	0.51
	GROSS BETA	DCM	BGCB) a	2 6	12	1.00			-0.250	2100	CC8.1	1.025	0.52
_	GROSS BETA	DC:N	100	0 6	20 9	85	8.			-0.400	36,000	7.707	0.735	0.98
	GROSS BETA	DCM	203	9 0	8 6	18	1.00			0.270	4.700	200.4	5.520	1.21
TOTAL-RADS	GROSS BETA	PCIA	202	, u	2 5	50	1.8			-0.010	4.300	0.170	1.304	0.47
			i	,	2	13	1.00			-2.100	3,000	0.824	1.108	0.51
												100	74:1	£):-

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EG&G ROCKY FLATS ENVIRONMENTAL TECHNOLOGY SITE CDPHE Conservative Screen for Operable Unit 3

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> TABLE B-3 COMPARISON TO BENCHMARK DATA-SURFACE WATER

Main Test Group Code	Chemicat Name	Hull WeN	Data Source	Area	Number of	Number of	Frequency of	Minimum Nondetected Value	Maximum Nondetected	Minimum Detected	Maximum Detected	Mean	Standard	Coefficient of
NOTE	l									2	200	Thomas and the same of the sam	Contained	Variation
BM-CR = Benchmark Stream Values (Balston Creek, Croke Canal Farmer's Highline canal //	m Values (Balaton Creek	Croke Canal F	₹armer's Highline	Canal (Arva	Arvada 1994))			•						
BM-LK = Benchmark Lakes/Reservoir Values (Chatfield Reservoir, Cherry Creek, Bear Creek	/Reservoir Values (Chatfi	eld Reservoir.	Cherry Creek. Be		ke, and Harrim	an Lake (Arva	Lake. and Harriman Lake (Arvada. 1994: EPA. 1993 and 1994))	193 and 1994))						
DISSOLVED-RADS	PLUTONIUM-239/240	pCi/L	BGCR		36	36	1.00	"		-0.123	0.900	0.116	0.204	1.76
DISSOLVED-RADS	PLUTONIUM-239/240	PCIL	BM-LK	80		55					0.206	0.004-0.016		
DISSOLVED-RADS	PLUTONIUM-239/240	pCi/L	CREEK	s	8	8	1.00			0.004	0.006	0.005	0.001	0.28
DISSOLVED-RADS	PLUTONIUM-239/240	pCi/L	200	တ	6	6	1.00			-0.003	0.002	0000	0.005	-7.82
DISSOLVED-RADS	PLUTONIUM-239/240	pCi/L	201	ဟ	13	13	1.00			-0.002	0.009	0.002	0.003	1.30
DISSOLVED-RADS	PLUTONIUM-239/240	pCVL	202	တ	0	10	1.00			-0.001	0.003	0.001	0.001	1.91
TOTAL-RADS	PLUTONIUM-239/240	pCi/L	BGCR	œ	105	105	1.00			-0.016	0.048	0.004	0.008	1.96
TOTAL-RADS	PLUTONIUM-239/240	pCi/L	CREEK	Ø	7	7	1.00			-0.001	0.001	0000	0.001	2.65
TOTAL-RADS	PLUTONIUM-239/240	pCi/L	500	s	13	13	1.00			-0.001	0.005	0.002	0.002	0.80
TOTAL-RADS	PLUTONIUM-239/240	PCI/L	201	တ	19	19	1.00			0.000	0.009	0.005	0.002	1.08
TOTAL-RADS	PLUTONIUM-239/240	PCi/L	202	တ	12	12	1.00			-0.005	0:030	0.005	0.010	1.84
TOTAL-RADS	TRITIUM	PCi/L	BGCR	σ.	73	23	1.00			-800.000	751.000	75.705	209.217	2.76
TOTAL-RADS	TRITIOM	PCIA	BM-LK	8		9					147.000	(-)19-147		
TOTAL-RADS	TRITIUM	pCi/L	500	Ø	ഹ	2	1,00			-29.100	144.300	47.776	83.228	1.74
DISSOLVED-RADS	URANIUM-233/234	pCi/L	вася	8	22	55	1.00			-0.016	1.800	0.359	0.365	1.01
DISSOLVED-RADS	URANIUM-233/234	PCI/L	CREEK	တ	8	8	1.00			0.480	0.480	0.480		
DISSOLVED-RADS	URANIUM-233/234	pCi/L	200	S	12	12	1.00			0.140	0.560	0.418	0.124	0.30
DISSOLVED-RADS	URANIUM-233/234	pCi/L	201	တ	12	12	1.00			0.430	1.200	0.741	0.227	0.31
DISSOLVED-RADS	URANIUM-233/234	pCi/L	202	S	9	10	1.00			0.170	0.699	0.350	0.182	0.52
TOTAL-RADS	URANIUM-233/234	pCi/L	BGCR	œ	79	79	1.00			-0.007	3.213	0.486	0.550	1.13
TOTAL-RADS	URANIUM-233/234	PCM	BM-LK	മ		26					2.100	0.32-1.3		
TOTAL-RADS	URANIUM-233/234	pCiA	CREEK	တ	9	9	8.			0.078	1.273	0.693	0.532	0.77
TOTAL-RADS	URANIUM-233/234	pci/L	200	တ	12	12	9:			0.190	1.200	0.609	0.313	0.51
TOTAL-RADS	URANIUM-233/234	pCi/L	201	တ	8	20	9:1			0.078	1.300	0.749	0.354	0.47
TOTAL-RADS	URANIUM-233/234	pCi/L	202	တ	5	13	1.00			0.080	0.820	0.388	0.238	0.61
DISSOLVED-RADS	URANIUM-235	pCi/L	BGCR	ø	26	26	1.00			-0.018	0.895	0.140	0.203	1.45
DISSOLVED-RADS	URANIUM-235	pCi/L	CREEK	တ	2	2	1.00			0.000	0.310	0.155	0.219	1.41
DISSOLVED-RADS	UHANIUM-235	рсіл	500	ဟ	12	15	1.00			-0.081	0.510	0.072	0.168	2.33
DISSOLVED-RADS	URANIUM-235	РСІЛ	201	Ø	12	12	1.00			-0.004	0.710	0.146	0.257	1.76
DISSOLVED-RADS	URANIUM-235	pCi/L	202	S	9	10	1.00			-0.198	0.140	0.020	0.094	4.73
TOTAL-RADS	URANIUM-235	pCi/L	BGCR	6 0	75	75	1.00			-0.030	0.376	0.049	0.075	1.52

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ACE WATER	
COMPARISON TO BENCHMARK DATA-SURFACE	

					Number of	Number of	Fractionery of	Minim	Maximum	Minimum	Maximum		Chandard	Coefficient of
Main Test Group Code	Chemical Name	New Unit	Data Source	Area	Detects	Samples	Detection	Nondetected Value	Value	value	Value	Mean*	Deviation	Variation
NOTE:														
BM-CR = Benchmark Stream Values (Raiston Creek, Croke Canal, Farmer's Highline canal (Arvada, 1994))	ım Values (Raiston Creek,	Croke Canal, F	armer's Highline	canal (Arva	ida, 1994))									
BM-LK = Benchmark Lakes/Reservoir Values (Chatfield Reservoir, Cherry Creek, Bear Creek Lake, and Harriman Lake (Arvada, 1994; EPA, 1993 and 1994))	s/Reservoir Values (Chatfi	eld Reservoir,	Cherry Creek, Be	ar Creek La	ke, and Harrin	nan Lake (Arva	da, 1994; EPA, 1	993 and 1994))						
TOTAL-RADS	URANIUM-235	pCi/L	BM-LK	8		.		•			0.100			
TOTAL-RADS	URANIUM-235	PCIA	CREEK	တ	9	9	- T			0000	0.170	0.081	0.075	0.92
TOTAL-RADS	URANIUM-235	pCi/L	200	တ	12	12	1.00			-0.039	0.410	0.082	0.125	1,53
TOTAL-RADS	URANIUM-235	pCi/L	201	တ	20	20	1.00			-0.021	0.270	0.070	0.074	1.06
TOTAL-RADS	URANIUM-235	pCi/L	202	တ	13	13	1.00			-0.028	0.145	0.032	0.059	1.83
DISSOI VED. BADS	HPANII IM-238	50	a	α	r.	ď	5			000	700	726.0	0200	ò
DISSOI VED BADS	IIDANII M-230		7 NO		3 \$	3	9			0000	2 6	0.50	0.2.0	0.30
DISSOLVED-DADS	CLAINIOIN-236	7		۵	2						2.00	0.910		
DISSOLVED-RADS	URANIUM-238	POF F	CREEK	တ	61	8	1.0			0.380	0.410	0.395	0.021	0.05
DISSOLVED-RADS	URANIUM-238	PCIA	200	တ	12	12	1.0			-0.046	0.580	0.296	0.186	0.63
DISSOLVED-RADS	URANIUM-238	PCIA	201	တ	12	12	5.5			-0.043	0.730	0.408	0.236	0.58
DISSOLVED-RADS	URANIUM-238	pCi/L	202	တ	1	₽	1.00			-0.255	0.420	0.135	0.193	1.43
TOTAL-RADS	URANIUM-238	PCI/L	BGCR	80	55	55	1.00			0000	1.820	0.364	0.432	1.18
TOTAL-RADS	URANIUM-238	pCi/L	BM-LK	60		26					5.500	0.28-1.49		
TOTAL-RADS	URANIUM-238	PCIV	CREEK	თ	9	9	1.00			-0.022	0.870	0.524	0.333	0.64
TOTAL-RADS	URANIUM-238	pCi/L	200	တ	12	12	1.00			-0.024	0.870	0.433	0.225	0.52
TOTAL-RADS	URANIUM-238	PCIAL	201	တ	ଛ	8	1.00			-0.022	1.100	0.618	0.292	0.47
TOTAL-RADS	URANIUM-238	pC/I/	202	တ	12	12	1.00			0.091	0.650	0.285	0.168	0.59
							v							

*For benchmark data, range of means is presented.

B = Background.

BGCR = Background Geochemical Characterization Report (1993c).

S = OU 3 (onsite).

Comparison of the Characteristic Comparison of	Comparison Com	Conception in Section 19 19 19 19 19 19 19 19	Non-Controlled Document																•	Para.							37 of 40	
Comparigney	Comparison Com	Authority Companies Comp																		5							5	
Handler, Marie Mar	Mainthoop Main	March Marc											Compart	son to Ber	Table B-4 Ichmark Dat	a-Groun	dwater											
Communication Communicatii Communication Communication Communication Communication	Maintaine Main	Companishment Companishmen Companishment Companishment Companishment Companishmen				eelqma2 to of	rad, of Detect	Min. Nondetect		720100000 .XISM	Nin. Detect		Arith. Mean	Spind, Dev.	m + 26	Upper Geo Chem. Min	Upper Geo Chem Max	Upper Geo. Chem, Mean	Std. Dev.	GS S aut9 risoM	Min Lower Geo	Мах Lower Geo	Меап Lower Geo	Std. Dev.	GS S aufq nseM	Min (Dragun)	(nugerd) xsM	(f) brebnet2
Mathematical Mat	Activities Continue Continu	ALTHOUND WELLOW BY SET IN THE CONTRING WELLOW BY SET IN THE CONTRICT OF THE CO	١.		+-	۰ م	0.13	ء خدا	9 9	R 8	47.1	-	16.231	13.249	42.730	2.5	1036	59.52	87.29	234.1	6 6	256	48.81	44.02	136.85	\$ €	\$ \$ \$	5000 (ag)
Mathematical Math	MATINICIANEN UNIT	MATHORNY GPT 1 1 10 10 1 1 1 10 10 1 1 1 10 10 1					1.00	2 ;		₹ ;		23400			27008.525	878	19950		4248.73	11240	, = 1	11700	1792	2773.43	7338.86		00 5	(Gr)
MATINICIAN UP 2	ANIMONY UNIT 2 8 0.255 15.0 E.S. 12.0 E.S. 12.	MATCHILMANI 1001 7 100 000 100		-	4.	-	29.	7 .		•		0.021	0.007	0.008	0.023	0.01	0.1		0.01	0.03	0	0.1	0.01	0.02	0.05		200	
Maintony	MINIMONY ULL 2 6 0.545 140 80.0 1 173 80.0 1 173 80.0 1 173 80.0 1 173 80.0 1 173 80.0 1 173 80.0 1 173 80.0 1 173 80.0 1 173 80.0 1 1 173 80.0 1 1 173 80.0 1 1 173 80.0 1 1 173 80.0 1 1 1 173 80.0 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	MINIMONY UNIT 1 6 10 55			_	7	1.00			- 1	- 1	0.0	0.005	0.003	0.011	-0.0	0.1	0.01	0.01	0.03	•	0.1	0.01	0.02	0.05			
MINIMONY UNION UNI	MINIMONY UGL 1 8 0.13 150 350 18 2.20 275 150 050 18 12.00 120 120 050 18 120	MINICANY UND. 1 6 0.13 15.0 35.0 1 6 1.27 0.12 15.1 15.1 15.1 15.1 15.1 15.1 15.1 1					0.25	13.0	36.0	8t 8t		89.8	22.013	27.836	0.000	e e e	2 2 2	4.7. 4.7.34	= = 5	39.54	4 4 1	35.65	15.5 15.5 15.5 15.5 15.5 15.5 15.5 15.5	9.17	33.84			
AMERING Word 1	ARSENCY Ug/L 1 0.13 1.1 1.1 0.13 1.1 1.1 0.13 1.1 1.1 0.13 1.1 0.13 1.1 0.13 1.1 0.13 1.1 0.13 1.1 0.13 1.1 0.13 1.1 0.13 1.1 0.13 1.1 0.13 1.1 0.13 1.1 0.1	Application			-		0.13	13.0 13.0	36.0 36.0	# #	27.5	27.5	12.750	127	0.000		86.6 86.6	19.19	12.85 12.85	44.89	0 6 0	2 4	15.62	10.4 4.0	36.42			
ARGENIC Ug/L 6 6 0351 12 2 6 12 6 2 2494 2.130 2.141 0.1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	ARBEINC UNIT 6 8 0.775 2.0 3.0 15 2.2 5.5 5.7 5.5 5.7 5.5 5.7 5.5 5.7 5.7 5.7	Mericing wild is a constant wild wild wild wild wild wild wild wild	ı		_		0.13	9	1	1.5	-	-	0.813	0.372	1.557	ł	15	1.63	1.84	5.31	9.4	6.2	2.41	1:	5.81		8 8	50 (dw)
According Acco	Campairing Cam	According Column		rgu rgu			0.75	2.0		či t	CN EC	50 g	5.138 2.004	8.070	21.278		ē.	59.	¥ .	5.37	0.35	6.2	2.41	2.02	5.81		8 8	(dw)
BEARLIUM Ugl. 6 0 7 6 0 7 6 6 6 6 1 7 6 6 6 6 1 7 6 6 6 1 2 6 6 6 6 6 1 6 6 6 6 6 1 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 7 6 6 7 6 6 7 7 6 6 6 7 7 6 6 7 7 6 6 7 7 6 6 7 7 6 7 7 7 8 7 <t< td=""><td> Hearing month mo</td><td> DATION UNIT Column UNIT Column Column UNIT</td><td></td><td>\$ \$</td><td></td><td></td><td>0.63</td><td>507</td><td></td><td>3 5</td><td>2 2</td><td>3.8</td><td>2.525</td><td>1.071</td><td>4.668</td><td></td><td>υ</td><td>1.95</td><td>1.7</td><td>5.37</td><td>0.35</td><td>7</td><td>2.76</td><td>2.02</td><td>6.8</td><td></td><td>33</td><td></td></t<>	Hearing month mo	DATION UNIT Column UNIT Column		\$ \$			0.63	507		3 5	2 2	3.8	2.525	1.071	4.668		υ	1.95	1.7	5.37	0.35	7	2.76	2.02	6.8		33	
A	California Cal	Particulum Langer	١.	You	Ĺ	1	0.75	16.0		1.5	24.2	55	28.838	15.310		14.75	203	83.42	34.56	152.54	34.8	132.5	84.18	21.79	127.76		200	1000 (dw)
PARHUM UNIVERSITY PARTURE PA	BARIUM UNION B 1,00 24.3 16.6 82.3 16.5 16.5 17.5	Bartillium ugl. 8 1,00 343 345 32,813 32,		Ngu			0.88	16.0	16.0	60	29.3	32	28.625	8.504		14.75	203	83.42	34.56	152.54	8 2	132.5	84.18	21.79	127.76		<u>6</u>	1000 (dw)
Figh	BERYLLIUM Ugl. 6 1.0 1.0 0.5 1.0 1.0 0.5 1.0 0.5 1.0 0.5 1.0 0.5 1.0 0.5 1.0 0.5 0.00 0.15 0.00 0.15 0.10 0.5 0.5 0.00 0.15 0.10 0.5 0.5 0.00 0.15 0.10 0.5 0.5 0.00 0.15 0.10	BERYLLIUM Ugl. 4 6 56 10 10 65 11 14 16 16 15 16 16 16 16 16		ig ig			8; £				26 26 26 26 27 28 28	38.5	32.913	3.323		25.9	317	102.44	45.37	193.18		3 8	113.95	51.97	217.89		8 8	
BERYLLIUM Ug/L 8 0.50 1.0 1.0 0.5 1.1 1.6 0.913 0.473 1.050 0.4 4.8 1.07 0.057 2.81 0.3 2.5 0.86 0.74 2.34 0.70 0.05 0.0	BERYLLIUM UgV	BERYLLIUM Ug/L 8 10 10 0.5 1.1 1.6 0.513 0.473 1.050 0.4 4 1.01 0.55 2.5 0.65 0.5	1		<u></u>			1.0		0.5					Į.	0.15	4	101	0.83	2.67	0.3	2.5	6.0	0.73	2.36		9 9	
STATISTICATION STAT	September Sept	E-FFICELIM 19				.	5	9.0			7	9	619	0.473		5.5	4 8	20,	0.87	2.81	0.0	2.5	0.86	0.74	23.8		2 2	
CADMIUM Ug/L 6 2.0 4.0 2 2.0 4.0 2 4.0 2 4.0 2 4.0 2 4.0 2 4.0 2 4.0 2 4.0 2 4.0 2 4.0 2 4.0 2 4.0 2 4.0 2 4.0 2 4.0 2 4.0 2 4.0	CADMIUM Ug/L 6 2 2 4 0 2 2 2 4 0 2 2 2 4 0 2 2 2 4 0 2 2 2 4 0 2 2 2 4 0 2 2 2 4 0 2 2 2 4 0 2 2 2 2 2 2 2 2 2	CADMIUM Ug/L 6 2.0 4.0 2 2.8 2.8 1.653 0.595 2.653 0.500 0.5 8.6 1.73 1.56 4.25 0.5 7.5 1.76 1.39 4.42 1.10 1.20 1.20 4.02 1.20 4.02 2.03 1.653 0.595					3	2		0.5		2				0.4	4.8	1.07	0.87	2.81	0.3	2.5	0.86	0.74	2.34		10	
CADMIUM Ugh 1	CADMINIMA Ug/L 8 1.0 2 2.8 2.8 1.683 0.585 1.11 1.64 1.29 4.22 0.5 3.7 1.45 1.75 2.95 0.5 1.11 1.64 1.29 4.22 0.5 3.5 1.45 0.75 2.95 0.7 CADMINIM Ug/L 8 1.00 2.0 4.0 2 2.8 2.893 0.55 1.11 1.64 1.29 4.2 0.5 3.5 1.45 0.75 2.95 CALCIUM ug/L 8 1.00 2.00 4.00 1.00 0.5 1.11 1.64 1.20 4.2 0.5 3.5 1.45 1.00 3.5 1.45 0.75 0.05 3.5 1.14 1.64 1.20 4.2 0.75 2.85 1.45 0.75 2.85 1.45 0.75 2.85 1.45 0.75 2.85 1.45 0.75 2.85 0.75 2.85 0.75	CADMIUM Ugh B 13 20 40 2 28 28 1683 0.5995 2.853 0.5 111 1.64 1.29 4.22 0.5 3.5 1.45 0.75 2.95 <	1	Van		. م		5.0	0.4	~ 4						0.5	9.6	1.73	1.26	4.25	0.5	7.5	1.76	e .	4.42			
CALCIUM Ugl. 8 1.00 2.00 267000 E4515 111 154 129 422 0.5 3.5 145 0.75 2560 CALCIUM Ugl. 8 1.00 2.00 26700 E4515 111 154 129 422 0.5 3.5 145 0.75 2560 CALCIUM Ugl. 8 1.00 2.00 26700 E4515 111 154 129 425 2.00 26700 E4515 111 1264 111 1264 110 126	CALCIUM Ugl. 8 1.00 4.0 2 27000 E-65 3135 1154 126 126 6.5 3.5 146 0.75 2.56 CALCIUM Ugl. 8 1.00 4.00 98100 E-65 3135 1151 154 12 126 12 0.5 3.5 146 0.75 2.56 CALCIUM Ugl. 8 1.00 4.00 98100 E-65 3135 1510 18400 E-65 3167.78 11836 1890 P-9400 B-1800 E-65 3135 1174 14 - 650000 CALCIUM Ugl. 8 1.00 4.00 98100 E-65 3135 1174 36 16900 E-65 3135 1174 14 - 650000 CALCIUM Ugl. 8 1.00 4.00 98100 E-65 3135 1510 18400 E-65 3167.78 11836 1890 P-9400 B-1800 E-65 3135 1174 14 - 650000 CALCIUM Ugl. 2 6 0.34 120 0.04 12 0	CALCIUM ugl. 8 1.00 2.0 4.00 6.5 11.1 1.64 1.29 4.22 6.5 3.5 1.46 0.75 2.96 4.0 7.00 0.00 0.5 11.1 1.64 1.29 4.22 0.6 3.5 1.46 0.75 2.96 7.00 0.00 0.0 1.10 0.0 0.00 0.5 11.1 1.64 1.29 4.22 0.6 3.5 1.46 0.75 2.96 7.0 0.00 0.0		on .			5	9 6	9 4	N 6	80	9.6	1 663	505		. c	2.5	2 2	2 2	4.22	3 6	200	145	0.75	2.95			
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EG&G HOCKY FLATS ENVIRONMENTAL TECHNOLOGY SITE CDPIE Conservative Screen Uperable Unit 3

Non-Controlled Document

Table B-4 Comparison to Benchmark Data--Groundwater

Appendix B 38 of 40

Section: Page:

State Common National Comm	
1483 0.372 2.157 1.316 7.01 6.64 20.33 1.214 5.25 4.61 7.84 6.10	Max. Nondetect
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(a) Boyles et al. (b) Lowy Landill background data. Notes: CDPHE Screen Report/Draft 2/Table 84. TMFTAI = Total nearest (infered).	(1) Colorado Bas.	ic Standards(dw) drinkin	g water, (se	(C) 88CO	ndary,	(ag) agn	cultural.					l	í			į	ì				i 	: 	į	<u>-</u>			
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DMETAL Excess Report/Draft 2/Table B4. DMETAL Exists/Over metal (filtered). TMETAL = Trial matal (militared).	(b) Lowry Landfill Notes:	background data.																									
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Appendix C
EXAMPLE OF WEIGHT-OF-EVIDENCE
EVALUATIONS

EG&G ROCKY FLATS ENVIRONMENTAL TECHNOLOGY SITE CDPHE Conservative Screen Operable Unit 3

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APPENDIX C. EXAMPLE OF WEIGHT-OF-EVIDENCE EVALUATIONS

Appendix C contains an example of the weight-of-evidence evaluations used for Step 1 of the CDPHE Conservative Screen. This example is Section 3.9 of TM 4 (DOE, 1994b) and describes the weight-of-evidence evaluation process and results for arsenic in OU 3 surface sediments.

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et al., 1984). Sediment data were also available from Cherry Creek Reservoir (DRCOG, 1994). In addition, background sediment stream data from the Lowry Landfill Superfund site was also used (EPA, 1992).

The primary data sets identified during the benchmark data collection activities for surface water included Ralston Creek, Croke Canal, and Farmer's Highline Canal (Arvada, 1994DB). The reservoir data were compared to Chatfield Reservoir, Cherry Creek Reservoir, Bear Creek Lake, and Harriman Lake (Arvada, 1994DB; EPA, 1993DB and 1994DB).

During the benchmark data-collection activities, information was also collected from lakes outside of Colorado for comparative purposes. Data from Superfund sites and other impacted areas were also collected. The purpose of using information from contaminated sites is to place the OU 3 concentration/activity levels in perspective with other investigated sites. These data sets are presented in figures summarizing the OU 3 concentrations/activities for a given chemical in Sections 5.0 and 6.0.

3.9 WEIGHT-OF-EVIDENCE EXAMPLE

This subsection presents an illustration of how the weight-of-evidence evaluation was applied to arsenic measured in OU 3 surface sediments.

A summary of the analytical results for arsenic in sediments (for each IHSS) is presented in Appendix C (Tables C-3 to C-9). Appendix C shows the summary statistics (before the COC selection was performed) by IHSS, including number of detects, number of samples, frequency of detection, minimum nondetected value, maximum nondetected value, minimum detected value, maximum detected value, arithmetic mean, standard deviation, normal 95 percent upper confidence limit (UCL), and lognormal 95 UCL. The summary statistics are used to provide the analyst the makeup of the data set (i.e., the frequency of detection and magnitude of concentration) before the COC selection process is performed. The use of summary statistics is part of an exploratory analysis phase that involved using visual and graphical presentations of the data (every chemical will not be displayed visually in this TM).

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3.9.1 Comparison of OU 3 Data to Benchmark Data

This step involves comparing the OU 3 data to benchmark data in a less formal, quantitative manner than using the five statistical tests described in Subsection 3.1. However, this step alone cannot eliminate arsenic as a COC. The benchmark data comparison in conjunction with the other weight-of-evidence evaluations provides the rationale that arsenic is not a COC.

This evaluation step for arsenic involved the use of a visual data-presentation technique (Figure 3-6) where the magnitude of concentrations of the OU 3 data for streams and reservoir sediment are presented with the Rocky Flats background data for stream sediments and relevant benchmark data from the literature. The top portion of Figure 3-6 is a tabulation of these data; the bottom segment profiles the data to promote comparison of individual data points as well as ranges. The data presented in Figure 3-6 include sediment data from Superfund sites, Rocky Mountain National Park lakes, the Great Lakes, Adirondack lakes, Cherry Creek Reservoir in Colorado, Missoula Lake bed sediments, and worldwide data. The purpose of using information from contaminated sites (the Warm Springs Pond Superfund site and the Clear Creek Superfund site) in addition to nonimpacted sites is to place OU 3 levels in perspective with other investigated sites.

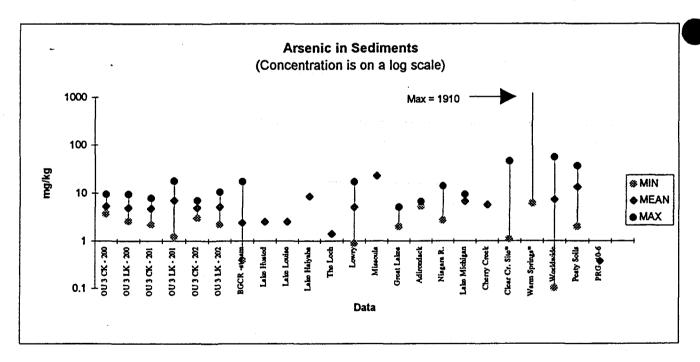
Figure 3-6 illustrates the following:

- The arsenic concentrations for OU 3 sediments between the IHSSs are consistent. All reported concentrations are less than 17.7 milligrams per kilogram (mg/kg) and there are no apparent spurious data that would suggest anomalous concentrations.
- The range of OU 3 arsenic concentrations in reservoirs (1.2 to 17.7 mg/kg) is comparable with the ranges of the BGCR (DOE, 1993c) data (sediments that are not impacted) 0.39 to 17.3 mg/kg. Additionally, the OU 3 and background data are within the range, and comparable to, the expected worldwide ranges (0.1 to 55 mg/kg, mean of 7.2 mg/kg).

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ARSENIC IN SEDIMENTS (mg/kg)

DATA	MiN	MEAN	MAX	STD DEV	COMMENTS/SOURCE
OU 3 CK - 200	3.7	5.31	9.4	1.85	Great Western Reservoir (Creek) (OU 3 Database)
OU 3 LK - 200	2.6	4.91	9.4	1.46	Great Western Reservoir (Lake) (OU 3 Database)
OU 3 CK - 201	2.2	4.76	7.8	1.53	Standley Lake (Creek) (OU 3 Database)
OU 3 LK - 201	1.2	6.96	17.7	4.34	Standley Lake (Lake) (OU 3 Database)
OU 3 CK - 202	3	4.88	6.8	1.56	Mower Reservoir (Creek) (OU 3 Database)
OU 3 LK - 202	2.2	5.15	10.4	1.96	Mower Reservoir (Lake) (OU 3 Database)
BGCR -stream	0.39	2.4	17.3	2.45	RFP Background Stream Sediments, BGCR (DOE, 1993c)
Lake Husted		2.5		0.2	Rocky Mountain National Park Lake Surface Sediment (Heit et al., 1984)
Lake Louise		2.5		0.3	Rocky Mountain National Park Lake Surface Sediment (Heit et al., 1984)
Lake Haiyaha		8.4		0.2	Rocky Mountain National Park Lake Surface Sediment (Heit et al., 1984)
The Loch		1.4		0.2	Rocky Mountain National Park Lake Surface Sediment (Heit et al., 1984)
Lowry	0.9	5	17	4	Lowry Landfill Background Stream Sediment OUs 2-5 Baseline Risk Assessment (EPA, 1992)
Missoula		23			Missoula Lake Beds Surface Sediment (Moore and Ramamoorthy, 1984)
Great Lakes	2		5		Great Lakes Surface Sediment (Fergusson, 1990)
Adirondack	5.3		6.5		Lake Adirondack Surface Sediment (Fergusson, 1990)
Niagara R.	2.7		14		Niagara River Sediment (polluted) (Fergusson, 1990)
Lake Michigan		6.6	9.2		Lake Michigan Surface Sediment (Fergusson, 1990)
Cherry Creek		5.57			Cherry Creek Reservoir Surface Sediment (CCBA, 1994)
Clear Cr. Site*	1.1		46		Clear Creek Superfund Site (CDPHE, 1990)
Warm Springs	6		1910		Warm Springs Pond Superfund Site, Pond Bottom Sediments (EPA, 1988)
Worldwide	0.1	7.2	55	7.2	Worldwide Sediment (Boyle & Jonasson, 1973)
Peaty Soils	2	13.4	36	9.4	Peaty Soils (Boyle & Jonasson, 1973)
PRG10 ⁻⁶		0.37			10 ⁻⁶ PRG level based on a residential soil scenario (EG&G, 1994a)



Notes: If blank, no data are available.

*Indicates Superfund site. OU 3 CK-200 = Creek sediment data in IHSS 200.

OU 3 LK-200 = Lake sediment data in IHSS 200.

Figure 3-6 EXAMPLE DATA COMPARISON—ARSENIC IN SEDIMENTS

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- The profile of the OU 3 mean concentrations of arsenic in OU 3 sediments (4.76 to 6.96 mg/kg) shows concentrations comparable to ranges of Lowry Landfill Superfund site stream sediments that are assumed not to be impacted (0.9 to 17 mg/kg).
- Both the OU 3 data and the benchmark data are distinguishable from these data representing arsenic contamination (e.g., Warm Springs Pond, Clear Creek). Arsenic concentrations in OU 3 are not within the upper end of the ranges of heavily polluted sites (Warm Springs Pond and Clear Creek). The maximum arsenic concentration in OU 3 sediments ranges from 6.8 mg/kg to 17.7 mg/kg, compared with 46 mg/kg at the Clear Creek Superfund site (CDPHE, 1990) and 1,910 mg/kg at the Warm Springs Pond Superfund site (EPA, 1988).

3.9.2 Temporal Analysis

OU 3 analytical data were also evaluated over time (if sufficient data collected over time were available) to discern any anomalous trend or pattern. Concentration levels sharply elevated at one point in time may indicate a historical release event contributing to concentrations above background. Sediment core profiles were analyzed for some analytes to evaluate if possible patterns existed throughout the sediment layer. Analyte profiles with discernible peaks may indicate source discharges from the RFETS.

Arsenic concentrations in sediment core profiles did not show any consistent peaks or patterns (Figure 3-7). The concentrations of arsenic in the sediment core samples range from 3.6 mg/kg to 35 mg/kg.

3.9.3 Spatial Analysis

Spatial analyses were performed for analytes in OU 3 sediments by evaluating patterns of concentrations at discreet sample points in each IHSS. Analytes showing a distinct spatial orientation rather than being randomly distributed may be designated as potential sources or

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potential hot spots. The physical processes (e.g., sedimentation near the inflow of a stream into a lake) affecting concentration distribution and the contribution of various water sources to OU 3 reservoirs are also assessed.

Arsenic concentrations were plotted at every sediment sample location in each IHSS on a map generated by GIS (see Figures F-1, F-2, and F-3 in Appendix F of this TM). The maps show that the arsenic concentrations tend to be higher in the samples collected in the middle of the reservoir than along the exposed shoreline and stream sediment samples. However, along the shoreline, in the streams, and in the middle areas of the reservoirs the arsenic levels are apparently randomly distributed. There is no discernible pattern of arsenic concentration in sediments, thus suggesting a natural, randomly distributed population. The distribution of data points is further evaluated in Subsection 3.8.4.

Natural limnological phenomena explain the slightly elevated concentrations in the center of the reservoirs. The finer particles of sediment tend to have the highest concentrations of organic matter and thus higher arsenic concentrations (Davis and Kent, 1990). The metals in OU 3 tend to exhibit this natural concentration distribution. The shoreline sediments are exposed most of the year and the finer-grained particles are preferentially removed by wind and water erosion. These finer-sediment particles in the water column also tend to deposit in the center of the lake where flow velocities can no longer support particle suspension.

3.9.4 Probability Plot Analysis

A software package, PROBPLOT, was used to assess populations within the OU 3 data sets (see Appendix G). PROBPLOT is conventionally used in the minerals exploration industry to guide investigators seeking anomalous mineral deposits (i.e., significantly above background) for extraction (Sinclair, 1986; Sinclair, 1976; Stanley, 1987). In this study, concentration data (detects only) for those chemicals with sufficient data (15 samples above detection limits for a given analyte and IHSS) were lognormally transformed and plotted on a cumulative frequency graph. Based on the cumulative frequency distribution, the number of populations for a given data set were identified. If one population was identified, it was inferred to represent a

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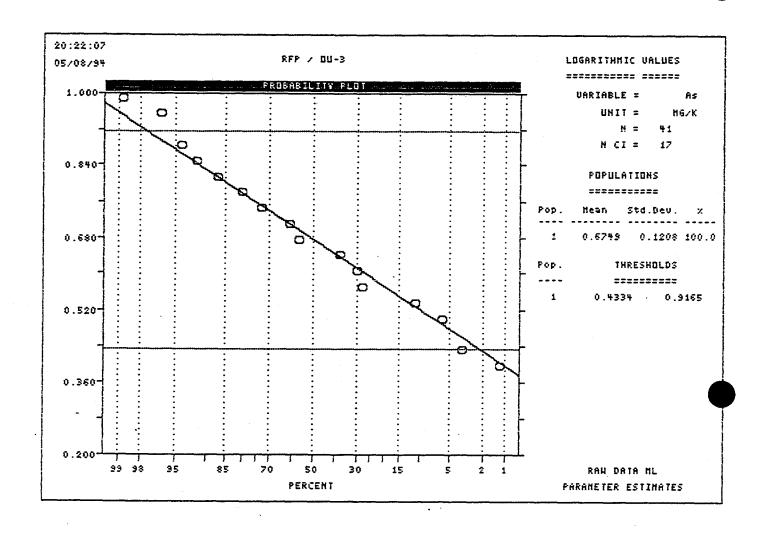
background population based on the comparison to background and benchmark data and the physicochemical processes occurring in the reservoirs. If two populations existed, it is possible that the higher population is the result of contamination. With two populations having low concentrations and concentrations that do not vary significantly between each other, however, the two populations may be explained by natural physical processes and not necessarily contamination (see Appendix G for examples).

According to the geochemical analysis using PROBPLOT, only one population is seen for arsenic in each of the three reservoirs. Figure 3-8 shows an example of PROBPLOT output for arsenic in Great Western Reservoir (IHSS 200). Because of low concentrations (comparable to benchmark data) and the lack of separate populations, arsenic in OU 3 samples is identified as falling within the background population. Although Standley Lake (IHSS 201) has a maximum that is almost twice that of Great Western Reservoir (IHSS 200) and Mower Reservoir (IHSS 202), the means are essentially equal and fall within benchmark data. Since Mower Reservoir receives 100 percent of its water input from the Rocky Flats Plant drainage area, and Great Western Reservoir and Standley Lake receive 65 percent to more than 90 percent, respectively, of water input from Clear Creek (ASI, 1990) one might expect significantly higher concentrations in Mower Reservoir if RFETS-related contamination were present. However, the arsenic concentrations in Mower Reservoir sediment are not significantly greater than Great Western Reservoir or Standley Lake; this suggests that arsenic originates from background sources and was deposited in the IHSS reservoirs by natural processes.

3.9.5 Conclusions from the Weight-of-Evidence Evaluation

Based on the full weight of the evidence presented in this section, the similarity of the OU 3 mean concentrations to background and benchmark, the probability plot analysis, and the lack of discernible spatial trends, arsenic has been eliminated as a COC in surface sediment for the three IHSSs.

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Appendix D RBC RATIOS FOR IHSSs 199 AND 200

EG&G ROCKY FLATS ENVIRONMENTAL TECHNOLOGY SITE CDPHE Conservative Screen Operable Unit 3

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APPENDIX D. RBC RATIOS FOR IHSS 199 AND 200

Appendix D contains the following tables:

Table D-1. Ratios of PCOC Concentrations/Activities to RBCs, OU 3 Surface Soil. (maximum detected result for each sample location, RBCs, PCOC-specific RBC ratios, and toxicity values used for RBCs).

Table D-2. Ratios of PCOC Concentrations/Activities to RBCs, OU 3 IHSS 200 Sediments and Groundwater. (maximum detected result for each PCOC per medium, RBCs, PCOC-specific RBC ratios, and toxicity values used for RBCs).

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Ratios of PCOC Concentration/Activities to RBCs Rocky Flats Plant OU3 Surface Soil Table D-1

					PCOC			
Location Code	Chemical Name	Unit	Max Result	RBC	Ratio	Oral SF	Inhal SF	Ext SF
PT12592	AMERICIUM-241	PCI/G	.0120		2.3728	.0051 2.400e-010	3.200e-008	4.900e-009
PT12592	PLUTONIUM-239/240	PCI/G	.0285	ניאן	3.4255	.0083 2.300e-010	3.800e-008	1.700e-011
PT12692	AMERICIUM-241	PCI/G	.0120	N	2.3728	.0051 2.400e-010	3.200e-008	4.900e-009
PT12692	PLUTONIUM-239/240	PC1/6	.0230	נאן	3,4255	.0067 2.300e-010	3.800e-008	1.700e-011
PT12792	AMERICIUM-241	PC1/6	.0292	N	2.3728	.0123 2.400e-010	3.200e-008	4.900e-009
PT12792	PLUTON1UM-239/240	PCI/G	.1324	1.01	3.4255	.0387 2.300e-010	3.800e-008	1.700e-011
PT12892	AMERICIUM-241	PCI/G	.0302	N	2.3728	.0127 2.400e-010	3.200e-008	4.900e-009
PT12892	PLUTONIUM-239/240	PC1/G	.0364	ניק	3.4255	.0106 2.300e-010	3.800e-008	1.700e-011
PT12992	PLUTON1UM-239/240	PC1/G	.0205	ניים	3.4255	.0060 2.300e-010	3.800e-008	1.700e-011
PT13092	AMERICIUM-241	PCI/G	.0210	10	2.3728	.0089 2.400e-010	3.200e-008	4.900e-009
PT13092	PLUTONIUM-239/240	PC1/G	.0465	ניאן	3.4255	.0136 2.300e-010	3.800e-008	1.700e-011
PT13192	AMERICIUM-241	PC1/G	.0275	· ·	2.3728	.0116 2.400e-010	3,200e-008	4.900e-009
PT13192	PLUTONIUM-239/240	PC1/G	.0685	(7)	3,4255	.0200 2.300e-010	3.800e-008	1.700e-011
PT13292	AMERICIUM-241	PC1/6	.0080	N	2.3728	.0034 2.400e-010	3.200e-008	4.900e-009
PT13292	PLUTONIUM-239/240	PC1/G	.0170	(P)	3.4255	.0050 2.300e-010	3.800e-008	1.700e-011
PT13392	AMERICIUM-241	PC1/G	.0110	•	2.3728	.0046 2.400e-010	3.200e-008	4.900e-009
PT13392	PLUTON1UM-239/240	PCI/G	0400	17	3.4255	.0119 2.300e-010	3.800e-008	1.700e-011
PT13492	AMERICIUM-241	PC1/G	.0030	,,	2.3728	.0013 2.400e-010	3.200e-008	4.900e-009
PT13492	PLUTONIUM-239/240	PCI/G	.0300	101	3.4255	.0088 2.300e-010	3.800e-008	1.700e-011
PT13592	AMERICIUM-241	PC1/6	.0615		2.3728	.0259 2.400e-010	3.200e-008	4.900e-009
PT13592	PLUTONIUM-239/240	PCI/G	.2050	κ,	3,4255	.0598 2.300e-010	3.800e-008	1.700e-011
PT13792	AMERICIUM-241	PC1/G	.0107		2.3728	.0045 2.400e-010	3,200e-008	4.900e-009
PT13792	PLUTON1UM-239/240	PCI/G	.0343	۲,	3.4255	.0100 2.300e-010	3.800e-008	1.700e-011
PT14092	AMERICIUM-241	PC1/G	.0095		2.3728	.0040 2.400e-010	3.200e-008	4.900e-009
PT14092	PLUTON1UM-239/240	PC1/6	.0205	r,	3,4255	.0060 2.300e-010	3.800e-008	1.700e-011
PT14192	AMERICIUM-241	PC1/G	.5200		2.3728	.2192 2.400e-010	3.200e-008	4.900e-009
PT14192	PLUTON1UM-239/240	PCI/G	2.9500	1-1	3,4255	.8612 2.300e-010	3.800e-008	1.700e-011

≖ External

Inhal = Inhalation

PCI/G = picocuries per gram
PCOC = Potential Chemical of Concern
RBC = Risk Based Concentration
SF = slope factor

Ratios of PCOC Concentration/Activities to RBCs OU3 Surface Soil Table D-1

Rocky Flats Plant

PCOC

			•				
Location Code	Chemical Name	Unit	Max Result R	RBC Ratio	Oral SF	Inhal SF	Ext SF
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		:	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1			:	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
PT14292	AMERICIUM-241	PCI/G	.0130	2.3728	.0055 2.400e-010	3.200e-008	4.900e-009
PT14292	PLUTONIUM-239/240	PCI/G	.2800	3.4255	.0817 2,300e-010	3.800e-008	1.700e-011
PT14392	AMERICIUM-241	PCI/G	0200	2.3728	.0084 2.400e-010	3.200e-008	4.900e-009
PT14392	PLUTON1UM-239/240	PCI/G	.2700	3,4255	.0788 2.300e-010	3.800e-008	1.700e-011
PT14492	AMERICIUM-241	PCI/G	.0330	2.3728	.0139 2.400e-010	3.200e-008	4.900e-009
PT14492	PLUTON1UM-239/240	PCI/G	.0151	3.4255	.0044 2,300e-010	3.800e-008	1.700e-011
PT14592	AMERICIUM-241	PCI/G	.0295	2.3728	.0124 2.400e-010	3.200e-008	4.900e-009
PT14592	PLUTONIUM-239/240	PCI/G	.0680	3.4255	.0199 2.300e-010	3.800e-008	1.700e-011
PT14692	AMERICIUM-241	PCI/G	.0130	2.3728	.0055 2.400e-010	3.200e-008	4.900e-009
PT14692	PLUTONIUM-239/240	PCI/G	.0345	3.4255	.0101 2,300e-010	3.800e-008	1.700e-011
PT14792	AMERICIUM-241	PC1/G	.0062	2.3728	.0026 2.400e-010	3.200e-008	4.900e-009
PT14792	PLUTONIUM-239/240	PCI/G	.0128	3,4255	.0037 2.300e-010	3.800e-008	1.700e-011
PT14892	AMERICIUM-241	PCI/G	.0010	2.3728	.0004 2.400e-010	3.200e-008	4.900e-009
PT14892	PLUTON1UM-239/240	PCI/G	.0075	3,4255	.0022 2.300e-010	3.800e-008	1.700e-011
PT14992	AMERICIUM-241	PCI/G	.0227	2.3728	.0096 2.400e-010	3.200e-008	4.900e-009
PT14992	PLUTONIUM-239/240	PC1/6	.0946	3.4255	.0276 2.300e-010	3.800e-008	1.700e-011
PT15092	AMERICIUM-241	PCI/G	.0355	2.3728	.0150 2.400e-010	3.200e-008	4.900e-009
PT15092	PLUTON1UM-239/240	PC1/G	.1604	3,4255	.0468 2.300e-010	3.800e-008	1.700e-011
PT15192	AMERICIUM-241	PC1/G	.0805	2.3728	.0339 2.400e-010	3.200e-008	4.900e-009
PT15192	PLUTONIUM-239/240	PCI/G	.7450	3,4255	.2175 2.300e-010	3.800e-008	1.700e-011
PT15292	AMERICIUM-241	PCI/G	.0953	2.3728	.0402 2.400e-010	3,200e-008	4.900e-009
PT15292	PLUTON1UM-239/240	PCI/G	.5107	3,4255	.1491 2.300e-010	3.800e-008	1.700e-011
PT15392	AMERICIUM-241	9/134	.0340	2.3728	.0143 2,400e-010	3.200e-008	4.900e-009
PT15392	PLUTONIUM-239/240	PCI/G	.2150	3,4255	.0628 2.300e-010	3.800e-008	1.700e-011
PT15492	AMERICIUM-241	PCI/G	.0255	2.3728	.0107 2.400e-010	3.200e-008	4.900e-009
PT15492	PLUTON1UM-239/240	PC1/6	.0545	3,4255	.0159 2.300e-010	3.800e-008	1,700e-011
PT15592	AMERICIUM-241	PCI/G	.0135	2.3728	.0057 2.400e-010	3.200e-008	4,900e-009
PT15592	PLUTON1UM-239/240	PC1/6	.0413	3,4255	.0121 2.300e-010	3.800e-008	1.700e-011

= External Ext

Inhal = Inhalation

PC1/G = picocuries per gram
PCOC = Potential Chemical of Concern
RBC = Risk Barral Concentration
SF = slope

= slope



Ratios of PCOC Concentration/Activities to RBCs Rocky Flats Plant OU3 Surface Soil Table D-1

				PCOC			
Location Code	Chemical Name	Unit	Max Result RBC	Ratio	o Oral SF	Inhal SF	Ext SF
PT15692	AMERICIUM-241	PCI/G	.0185	2.3728	.0078 2.400e-010	3.200e-008	4.900e-009
PT15692	PLUTONIUM-239/240	PCI/G	.0360	3.4255	.0105 2.300e-010	3.800e-008	1.700e-011
PT15792	AMERICIUM-241	PC1/6	0020	2.3728	0008 2.400e-010	3,200e-008	4.900e-009
PT15792	PLUTONIUM-239/240	PCI/G	.0115	3,4255	.0034 2.300e-010	3.800e-008	1.700e-011
PT15892	AMERICIUM-241	PC1/G	.0040	2.3728	.0017 2,400e-010	3,200e-008	4.900e-009
PT15892	PLUTONIUM-239/240	PCI/G	.0415	3,4255	.0121 2.300e-010	3.800e-008	1.700e-011
PT15992	AMERICIUM-241	PCI/G	0900.	2.3728	.0025 2.400e-010	3,200e-008	4.900e-009
PT15992	PLUTONIUM-239/240	PCI/G	.2820	3.4255	.0823 2.300e-010	3.800e-008	1.700e-011
PT16092	AMERICIUM-241	PCI/G	.0035	2.3728	.0015 2.400e-010	3.200e-008	4.900e-009
PT16092	PLUTONIUM-239/240	PCI/G	.0410	3.4255	.0120 2.300e-010	3.800e-008	1.700e-011
PT16192	AMERICIUM-241	PCI/G	.0158	2.3728	.0066 2.400e-010	3.200e-008	4.900e-009
PT16192	PLUTON1UM-239/240	PCI/G	.0523	3,4255	.0153 2.300e-010	3.800e-008	1.700e-011
PT16292	AMERICIUM-241	PCI/G	.0675	2.3728	.0284 2.400e-010	3.200e-008	4.900e-009
PT16292	PLUTON1UM-239/240	PCI/G	.0890	3,4255	.0260 2.300e-010	3.800e-008	1.700e-011
PT16392	AMERICIUM-241	PCI/G	.0535	2.3728	.0225 2.400e-010	3.200e-008	4.900e-009
PT16392	PLUTONIUM-239/240	PCI/G	.1145	3,4255	.0334 2.300e-010	3.800e-008	1.700e-011
PT16492	AMERICIUM-241	PC1/6	6200.	2.3728	.0033 2.400e-010	3.200e-008	4.900e-009
PT16492	PLUTON1UM-239/240	PCI/G	.0238	3,4255	.0069 2.300e-010	3.800e-008	1.700e-011
PT16592	AMERICIUM-241	PC1/G	.0131	2.3728	.0055 2.400e-010	3.200e-008	4.900e-009
PT16592	PLUTONIUM-239/240	PCI/G	.0340	3.4255	.0099 2.300e-010	3.800e-008	1.700e-011
PT16692	AMERICIUM-241	PCI/G	.0267	2.3728	.0112 2.400e-010	3.200e-008	4.900e-009
PT16692	PLUTONIUM-239/240	PC1/6	.0402	3.4255	.0117 2.300e-010	3.800e-008	1.700e-011
PT16792	AMERICIUM-241	PCI/G	.0005	2.3728	.0002 2.400e-010	3.200e-008	4.900e-009
PT16792	PLUTON1UM-239/240	PCI/G	.0200	3,4255	.0058 2.300e-010	3.800e-008	1.700e-011
PT16992	AMERICIUM-241	PCI/G	.0025	2.3728	.0011 2.400e-010	3.200e-008	4.900e-009
PT16992	PLUTONIUM-239/240	PCI/G	.0280	3.4255	.0082 2.300e-010	3.800e-008	1.700e-011
PT17092	AMERICIUM-241	PCI/G	.0110	2.3728	.0046 2.400e-010	3.200e-008	4.900e-009
PT17092	PLUTON1UM-239/240	PCI/G	.0305	3.4255	.0089 2.300e-010	3.800e-008	1.700e-011

= External

= Inhalation Inhal

PCI/G = picocuries per gram
PCOC = Potential Chemical of Concern
RBC = Risk Based Concentration
SF = slope factor

Table D-1 Ratios of PCOC Concentration/Activities to RBCs Rocky Flats Plant OU3 Surface Soil

Location Code	Chemical Name	Unit	Max Result RBC	PCOC Ratio	Oral SF	Inhal SF	Ext SF
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		:				1 2 2 6 6 6 8	2 2 3 6 5 5 6 7
PT17192	AMERICIUM-241	PC1/G	.0265	2.3728	.0111 2.400e-010	3.200e-008	4.900e-009
PT17192	PLUTONIUM-239/240	PC1/6	.0165	3.4255	.0048 2.300e-010	3.800e-008	1.700e-011
PT17292	PLUTONIUM-239/240	PC1/G	.0852	3,4255	.0249 2.300e-010	3.800e-008	1.700e-011
PT17392	AMERICIUM-241	PC1/G	.0045	2.3728	.0019 2.400e-010	3.200e-008	4.900e-009
PT17392	PLUTONIUM-239/240	PC1/G	.0340	3,4255	.0099 2.300e-010	3.800e-008	1.700e-011
PT17492	AMERICIUM-241	PC1/G	.0020	2.3728	.0008 2.400e-010	3.200e-008	4.900e-009
PT17492	PLUTONIUM-239/240	PC1/G	.0165	3.4255	.0048 2.300e-010	3.800e-008	1.700e-011
PT17692	AMERICIUM-241	PCI/G	.0035	2.3728	.0015 2.400e-010	3.200e-008	4.900e-009
PT17692	PLUTONIUM-239/240	PC1/G	.0120	3,4255	.0035 2.300e-010	3.800e-008	1.700e-011
PT17792	AMERICIUM-241	PC1/6	.0080	2.3728	.0034 2.400e-010	3.200e-008	4.900e-009
PT17792	PLUTONIUM-239/240	PC1/G	.0740	3.4255	.0216 2.300e-010	3.800e-008	1.700e-011
PT17992	AMERICIUM-241	PCI/G	.0139	2.3728	.0059 2.400e-010	3.200e-008	4.900e-009
PT17992	PLUTONIUM-239/240	PC1/6	.0586	3.4255	.0171 2.300e-010	3.800e-008	1.700e-011
PT18592	AMERICIUM-241	PC1/G	.0985	2.3728	.0415 2.400e-010	3.200e-008	4.900e-009
PT18592	PLUTONIUM-239/240	PCI/G	0599	3,4255	.1941 2.300e-010	3.800e-008	1.700e-011
PT18692	AMERICIUM-241	PCI/G	.0355	2.3728	.0150 2.400e-010	3.200e-008	4.900e-009
PT18692	PLUTONIUM-239/240	PCI/G	.7350	3.4255	.2146 2.300e-010	3.800e-008	1.700e-011
PT18792	AMERICIUM-241	PC1/6	.0113	2.3728	.0048 2.400e-010	3.200e-008	4.900e-009
PT18792	PLUTONIUM-239/240	PC1/G	.0510	3.4255	.0149 2.300e-010	3.800e-008	1.700e-011
PT18892	AMERICIUM-241	PC1/G	.0125	2.3728	.0053 2,400e-010	3.200e-008	4.900e-009
PT18892	PLUTONIUM-239/240	PC1/G	.0208	3,4255	.0061 2.300e-010	3.800e-008	1.700e-011
PT18992	PLUTONIUM-239/240	PC1/G	.0194	3,4255	.0057 2.300e-010	3.800e-008	1.700e-011
PT19092	AMERICIUM-241	PCI/G	.0088	2.3728	.0037 2.400e-010	3.200e-008	4.900e-009
PT19092	PLUTONIUM-239/240	PC1/G	.0322	3.4255	.0094 2.300e-010	3.800e-008	1.700e-011
PT19192	AMERICIUM-241	PC1/G	.0377	2.3728	.0159 2.400e-010	3.200e-008	4.900e-009
PT19192	PLUTONIUM-239/240	PC1/6	.1480	3.4255	.0432 2.300e-010	3.800e-008	1.700e-011
PT19292	AMERICIUM-241	PC1/G	. 1659	2.3728	.0699 2.400e-010	3.200e-008	4.900e-009
PT19292	PLUTONIUM-239/240	PC1/6	.3210	3,4255	.0937 2.300e-010	3.800e-008	1.700e-011

Inhal = Inhalation = External

PCI/G = picocuries per gram
PCOC = Potential Chemical of Concern
RBC = Risk Bar Concentration
SF = slope



Ratios of PCOC Concentration/Activities to RBCs Rocky Flats Plant OU3 Surface Soil Table D-1

			•	PCOC			
Location Code	Chemical Name	Unit	Max Result RBC	Ratio	Oral SF	Inhal SF	Ext SF
PT19392	PLUTONIUM-239/240	PC1/6	.0140	3.4255	.0041 2.300e-010	3.800e-008	1.700e-011
PT19492	AMERICIUM-241	PCI/G	.0765	2.3728	.0322 2.400e-010	3.200e-008	4.900e-009
PT19492	PLUTONIUM-239/240	PC1/G	.0865	3,4255	.0253 2.300e-010	3.800e-008	1.700e-011
PT19592	AMERICIUM-241	PC1/G	.0515	2.3728	.0217 2.400e-010	3.200e-008	4.900e-009
PT19592	PLUTONIUM-239/240	PC1/G	.2500	3,4255	.0730 2.300e-010	3.800e-008	1.700e-011
PT19692	AMERICIUM-241	PC1/G	0900.	2.3728	.0025 2.400e-010	3.200e-008	4.900e-009
PT19692	PLUTONIUM-239/240	PC1/G	0600	3,4255	.0026 2.300e-010	3.800e-008	1.700e-011
110	AMERICIUM-241	PCI/G	.0532	2.3728	.0224 2.400e-010	3.200e-008	4.900e-009
110	PLUTONIUM-239/240	PCI/G	.2487	3,4255	.0726 2.300e-010	3.800e-008	1.700e-011
T11	AMERICIUM-241	PC1/6	.0647	2.3728	.0273 2.400e-010	3.200e-008	4.900e-009
111	PLUTONIUM-239/240	PC1/G	.4803	3,4255	.1402 2.300e-010	3.800e-008	1.700e-011
T12A	AMERICIUM-241	PC1/6	.0487	2.3728	.0205 2.400e-010	3.200e-008	4.900e-009
T12A	PLUTON1UM-239/240	PCI/G	.2883	3,4255	.0842 2.300e-010	3.800e-008	1.700e-011
T12B	AMERICIUM-241	PC1/G	.0483	2.3728	.0203 2.400e-010	3.200e-008	4.900e-009
T12B	PLUTON1UM-239/240	PCI/G	.3564	3,4255	.1040 2.300e-010	3.800e-008	1.700e-011
T13A	AMERICIUM-241	PCI/G	. 1997	2.3728	.0842 2.400e-010	3.200e-008	4.900e-009
T13A	PLUTON1UM-239/240	PC1/G	.8913	3,4255	.2602 2.300e-010	3.800e-008	1.700e-011
T13B	AMERICIUM-241	PC1/G	.0951	2.3728	.0401 2.400e-010	3.200e-008	4.900e-009
T138	PLUTONIUM-239/240	PC1/G	9589.	3,4255	.2001 2.300e-010	3.800e-008	1.700e-011
T14A	AMERICIUM-241	PCI/G	.1000	2.3728	.0421 2.400e-010	3.200e-008	4.900e-009
T14A	PLUTONIUM-239/240	PCI/G	.6077	3,4255	.1774 2.300e-010	3.800e-008	1,700e-011
T14B	AMERICIUM-241	PCI/G	.0882	2.3728	.0372 2.400e-010	3.200e-008	4.900e-009
T14B	PLUTON1UM-239/240	PC1/G	.4324	3.4255	.1262 2.300e-010	3.800e-008	1.700e-011
T15A	AMERICIUM-241	PC1/6	.2128	2.3728	.0897 2.400e-010	3.200e-008	4.900e-009
	PLUTONIUM-239/240	PCI/G	1.3360	3,4255	.3900 2.300e-010	3.800e-008	1.700e-011
T15B	AMERICIUM-241	PC1/G	.1403	2.3728	.0591 2.400e-010	3.200e-008	4.900e-009
T158	PLUTONIUM-239/240	PC1/G	1.0840	3,4255	.3165 2.300e-010	3.800e-008	1.700e-011
T1A	PLUTONIUM-239/240	PC1/G	.9517	3,4255	.2778 2.300e-010	3.800e-008	1.700e-011

= Inhalation = External

= picocuries per gram

= Potential Chemical of Concern

= Risk Based Concentration Inhal PCI/G PCOC RBC SF

= slope factor

Table D-1 Ratios of PCOC Concentration/Activities to RBCs OU3 Surface Soil Rocky Flats Plant

				PCOC			
Location Code	Chemical Name	Unit	Max Result RBC	Ratio	Oral SF	Inhal SF	Ext SF
118	PLUTONIUM-239/240	PCI/G	1.4750	3.4255	.4306 2.300e-010	3.800e-008	1.700e-011
T2A	PLUTONIUM-239/240	PCI/G	.7572	3.4255	.2211 2.300e-010	3.800e-008	1.700e-011
128	PLUTONIUM-239/240	PCI/G	.6805	3.4255	.1987 2.300e-010	3.800e-008	1.700e-011
120	PLUTON1UM-239/240	PC1/G	1.6000	3,4255	.4671 2.300e-010	3.800e-008	1.700e-011
T3A	PLUTON1UM-239/240	PCI/G	.9228	3.4255	.2694 2.300e-010	3.800e-008	1.700e-011
T3B	PLUTON1UM-239/240	PCI/G	.7336	3.4255	.2142 2.300e-010	3.800e-008	1.700e-011
130	PLUTON1UM-239/240	PC1/G	.6555	3.4255	.1914 2.300e-010	3.800e-008	1.700e-011
T4A	AMERICIUM-241	PCI/G	.1614	2.3728	.0680 2.400e-010	3.200e-008	4.900e-009
T4A	PLUTON1UM-239/240	PCI/G	.8084	3,4255	.2360 2.300e-010	3,800e-008	1.700e-011
148	AMERICIUM-241	PCI/G	.0784	2.3728	.0330 2.400e-010	3.200e-008	4.900e-009
148	PLUTONIUM-239/240	PCI/G	.3650	3,4255	.1066 2.300e-010	3.800e-008	1.700e-011
75	AMERICIUM-241	PC1/G	.1277	2.3728	.0538 2.400e-010	3.200e-008	4.900e-009
75	PLUTONIUM-239/240	PC1/G	.5661	3,4255	.1653 2.300e-010	3.800e-008	1.700e-011
16	AMERICIUM-241	PCI/G	.0603	2.3728	.0254 2.400e-010	3.200e-008	4.900e-009
16	PLUTON1UM-239/240	PC1/6	.4764	3.4255	.1391 2.300e-010	3.800e-008	1.700e-011
17	AMERICIUM-241	PC1/G	.0564	2.3728	.0238 2.400e-010	3.200e-008	4.900e-009
17	PLUTONIUM-239/240	PC1/G	.1624	3.4255	.0474 2.300e-010	3,800e-008	1.700e-011
18	AMERICIUM-241	PCI/G	0400	2.3728	.0171 2.400e-010	3.200e-008	4.900e-009
18	PLUTONIUM-239/240	PCI/G	.2252	3.4255	.0657 2.300e-010	3.800e-008	1.700e-011
19	AMERICIUM-241	PCI/G	.1137	2.3728	.0479 2.400e-010	3.200e-008	4.900e-009
19	PLUTON1UM-239/240	PCI/G	.5915	3,4255	.1727 2.300e-010	3,800e-008	1.700e-011
U10A	AMERICIUM-241	PC1/G	.3631	2.3728	.1530 2.400e-010	3.200e-008	4.900e-009
U10A	PLUTON1UM-239/240	PCI/G	1.7390	3.4255	.5077 2.300e-010	3.800e-008	1.700e-011
U10B	AMERICIUM-241	PC1/G	.2291	2.3728	.0966 2.400e-010	3.200e-008	4.900e-009
U10B	PLUTONIUM-239/240	PC1/6	1.0890	3.4255	.3179 2.300e-010	3.800e-008	1.700e-011
U11A	AMERICIUM-241	PC1/G	.1119	2.3728	.0472 2.400e-010	3.200e-008	4.900e-009
U11A	PLUTONIUM-239/240	PC1/6	.7180	3,4255	.2096 2.300e-010	3.800e-008	1.700e-011
U11B	AMERICIUM-241	PC1/G	.1406	2.3728	.0593 2.400e-010	3.200e-008	4.900e-009

Inhal = Inhalation = External

= Potential Chemical of Concern

Concentration PCJ/G = picocuries per gram
PCOC = Potential Chemical of
RBC = Risk Bar Concentrati
SF = slope



Ratios of PCOC Concentration/Activities to RBCs Rocky Flats Plant OU3 Surface Soil Table D-1

Location Code	Chemical Name	Unit	Max Result RRC	PCOC	ler O	Inhal SF	FX SF
				1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
U11B	PLUTONIUM-239/240	PCI/G	.7711	3.4255	.2251 2.300e-010	3.800e-008	1.700e-011
U12A	AMERICIUM-241	PC1/G	.1948	2.3728	.0821 2.400e-010	3,200e-008	4.900e-009
U12A	PLUTON1UM-239/240	PCI/G	.9722	3.4255	.2838 2.300e-010	3.800e-008	1.700e-011
U12B	AMERICIUM-241	PC1/G	. 1222	2.3728	.0515 2.400e-010	3.200e-008	4.900e-009
U12B	PLUTON1UM-239/240	PC1/G	.7422	3.4255	.2167 2.300e-010	3.800e-008	1.700e-011
U13A	AMERICIUM-241	PCI/G	. 1965	2.3728	.0828 2.400e-010	3.200e-008	4.900e-009
U13A	PLUTONIUM-239/240	PCI/G	1.2720	3.4255	.3713 2.300e-010	3.800e-008	1.700e-011
U13B	AMERICIUM-241	PCI/G	. 1585	2.3728	.0668 2.400e-010	3.200e-008	4.900e-009
U138	PLUTON1UM-239/240	PCI/G	.7617	3.4255	.2224 2.300e-010	3.800e-008	1.700e-011
U14A	AMERICIUM-241	PC1/G	.1379	2.3728	.0581 2.400e-010	3.200e-008	4.900e-009
U14A	PLUTONIUM-239/240	PC1/G	.6831	3.4255	.1994 2.300e-010	3.800e-008	1.700e-011
U148	AMERICIUM-241	PC1/G	.1613	2.3728	.0680 2.400e-010	3.200e-008	4.900e-009
U14B	PLUTONIUM-239/240	PC1/G	. 9893	3,4255	.2888 2.300e-010	3.800e-008	1.700e-011
U1A	PLUTONIUM-239/240	PCI/G	6.4680	3,4255	1.8882 2.300e-010	3.800e-008	1.700e-011
U1B	PLUTONIUM-239/240	PC1/G	2.6720	3,4255	.7800 2.300e-010	3.800e-008	1.700e-011
UZA	PLUTONIUM-239/240	PCI/G	3.5900	3,4255	1.0480 2.300e-010	3.800e-008	1.700e-011
U2B	PLUTONIUM-239/240	PC1/6	1.2190	3.4255	.3559 2.300e-010	3.800e-008	1.700e-011
U3A	AMERICIUM-241	PCI/G	.2792	2.3728	.1177 2.400e-010	3.200e-008	4.900e-009
U3A	PLUTONIUM-239/240	PCI/G	1.6960	3,4255	.4951 2.300e-010	3.800e-008	1.700e-011
U3B	AMERICIUM-241	PC1/G	.2602	2.3728	.1097 2.400e-010	3.200e-008	4.900e-009
U3B	PLUTONIUM-239/240	PCI/G	1.1900	3,4255	.3474 2.300e-010	3.800e-008	1.700e-011
70	AMERICIUM-241	PC1/6	0660.	2.3728	.0417 2.400e-010	3.200e-008	4.900e-009
70	PLUTONIUM-239/240	PCI/G	.1777	3.4255	.0519 2.300e-010	3.800e-008	1.700e-011
NS	AMERICIUM-241	PCI/G	.1176	2.3728	.0496 2.400e-010	3.200e-008	4.900e-009
US	PLUTONIUM-239/240	PCI/G	.4119	3.4255	.1202 2.300e-010	3.800e-008	1.700e-011
90	AMERICIUM-241	PC1/G	.1008	2.3728	.0425 2.400e-010	3.200e-008	4.900e-009
90	PLUTON1UM-239/240	PC1/G	.4236	3.4255	.1237 2.300e-010	3.800e-008	1.700e-011
UZ	AMERICIUM-241	PCI/G	.2677	2.3728	.1128 2.400e-010	3.200e-008	4.900e-009

= External

Inhal = Inhalation

PCI/G = picocuries per gram
PCOC = Potential Chemical of Concern
RBC = Risk Based Concentration
SF = slope factor

Table D-1

Ratios of PCOC Concentration/Activities to RBCs Rocky Flats Plant OU3 Surface Soil

				PC0C			
Location Code	Location Code Chemical Name	Unit	Max Result RBC	C Ratio	Oral SF	Inhal SF	Ext SF
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1							1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
UZ	PLUTONIUM-239/240	PC1/G	1.1510	3,4255	.3360 2.300e-010 3.800e-008 1.700e-011	3.800e-008	1.700e-011
81	AMERICIUM-241	PCI/G	.1500	2.3728	.0632 2.400e-010 3.200e-008	3.200e-008	4.900e-009
N8	PLUTONIUM-239/240	PC1/G	.2009	3,4255	.0586 2.300e-010 3.800e-008	3.800e-008	1.700e-011
60	AMERICIUM-241	PCI/G	.3059	2.3728	.1289 2.400e-010 3.200e-008	3.200e-008	4.900e-009
60	PLUTON1UM-239/240	PCI/G	1.8570	3,4255	.5421 2.300e-010 3.800e-008 1.700e-011	3.800e-008	1.700e-011

Inhal = Inhalation = External

= Potential Chemical of Concern

Concentration PCI/G = picocuries per gram
PCOC = Potential Chemical of 8
RBC = Risk Br Concentrati

Ratios of PCOC Concentration/Activities to RBCs OUS - IHSS 200 - Sediments and Groundwater Rocky Flats Plant Table D-2

						PCOC	PCOC					
Medium	Chemical Name	Unit	Max Result RBC - C	RBC - C	RBC - NC	Ratio - C	Ratio - NC	RBC - NC Ratio - C Ratio - NC Oral SF Inhal SF		Ext SF	Oral RFD	Inhal RFD
1 1 1 1 1				- 1						1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		
MS	STRONTIUM	MG/L	5.5900		21.9000		.2553	~			6.000e-001	
SD	PLUTONIUM-239/240 PCI/G	PCI/G	4.0400	3,4255		1.1794		2.300e-010	2.300e-010 3.800e-008 1.700e-011	1.700e-011		
SD	COPPER	MG/KG	311.0000		11000.0000		.0283	~			4.000e-002	

= carcinogenic = External

Inhal = Inhalation

MG/L = milligrams per liter

PCI/G = picocuries per gram ≃ non-carcinogenic

PCOC = Potential Chemical of Concern

RBC = Risk Based Concentration RFD = reference dose SF = slope factor

Appendix E EVALUATION OF DERMAL CONTACT

EG&G ROCKY FLATS ENVIRONMENTAL TECHNOLOGY SITE CDPHE Conservative Screen Operable Unit 3

Section: Page: Appendix E 1 of 2

Non-Controlled Document

APPENDIX E. EVALUATION OF DERMAL CONTACT

Appendix E contains results of the dermal contact evaluations for surface-soil Source Areas. As discussed in Section 6.0 of this document (Step 5 of the CDPHE Conservative Screen), any Source Areas that have Ratio Sums less than 1 require no further action by DOE, pending results of a dermal contact evaluation.

Dermal exposure to PCOCs in surface soil is not considered a significant exposure pathway for OU 3 because inorganic chemicals are not expected to be significantly absorbed through the skin (EPA, 1989a; EPA, 1992). As a screening step to support this assumption, maximum values for PCOCs in each Source Area that has a Ratio Sum less than 1 were compared to risk-based concentrations based on dermal contact (Dermal RBCs). Dermal RBCs were calculated using exposure parameters provided by EG&G (Table E-1).

All surface-soil Source Areas have ²⁴¹Am and ^{239/240}Pu activities below the Dermal RBCs. (The maximum ²⁴¹Am activity for all Source Areas is 0.52 pCi/g and the ²⁴¹Am Dermal RBC is 273 pCi/g; the maximum ^{239/240}Pu activity for all Source Areas is 6.47 pCi/g and the ^{239/240}Pu Dermal RBC is 285 pCi/g.) Results of the screening step comparing measured activities of PCOCs in surface soil to Dermal RBCs confirm the assumption that dermal exposure is not a significant exposure pathway for OU 3.

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Table E-1 Evaluation of Dermal Contact Surface Soils

		Carcinoge	nic RBC		Non-Carcir	nogenic RBC
Risk-based Concentrations	Organics a	nd Metals	Radior	nuclides	Organics	and Metals
Dermal Exposure						
	[kg-day/mg]	[mg/kg]	[risk/pCi]	[pCi/g]	[mg/kg-day]	[mg/kg]
Chemical	SF	RBC-C	SF	RBC-C	RfD	RBC-NC
²⁴¹ Am			2.40E-10	273		
^{239/240} Pu	<u> </u>		2.30E-10	285		
²³⁸ U			1.60E-11	4091		
²³⁵ U			1.60E-11	4091		
233/234			1.60E-11	4091		
Aluminum	-				-	
Antimony	<u>-</u>				4.00E-04	2.01E+04
Arsenic	1.75	67			3.00E-04	1.51E+04
Barium	-				7.00E-02	3.51E+06
Beryllium	4.3	27			5.00E-03	2.51E+05
Cadmium	<u> </u>			 	5.00E-04	2.51E+04
Chromium	-				5.00E-03	2.51E+05
Cobalt	_				-	
Copper	-			<u></u>	4.00E-02	2.01E+06
Cyanide	<u>-</u>				2.00E-02	1.00E+06
Manganese	<u>-</u>			-	5.00E-03	2.51E+05
Mercury	<u>-</u>				3.00E-04	1.51E+04
Molybdenum	-				5.00E-03	2.51E+05
Nickel	<u> </u>				2.00E-02	1.00E+06
Selenium					5.00E-03	2.51E+05
Silver	-				5.00E-03	2.51E+05
Strontium	-				6.00E-01	3.01E+07
Tin	-			·	6.00E-01	3.01E+07
Vanadium	-				7.00E-03	3.51E+05
Zinc	-				3.00E-01	1.51E+07
					<u> </u>	
RBC-C[pCi/g] = TR / (ED x SF x E						
RBC-C [mg/kg] = (TR x ATC x BW				<u></u>		
RBC-NC [mg/kg] = (THI x ATN x B	W) / (ED x 1/RfD)	(EF x SA x AB	F x ADF x CF-	m)		
	<u> </u>					
Dermal Contact with Surficial Soils	 					
Target Risk	TR	1.0E-6	[-]			
Target Hazard Index	THI	1	[-]		<u> </u>	
Surface Area	SA	2910	[cm ²] or [cm ² /e	event]	1	
Absorption Factor - Organics	ABFo	0.01	[-]			
Absorption Factor - Inorganics	ABFi	0.001	[-]			
Soil-to-Skin Adherence Factor	ADF	0.5	[mg/cm ²]			
Exposure Frequency	<u>EF</u>	350	[days/yr] or [ev	ents/yr]		
Exposure Duration	ED	30	[yr]			
Body Weight	BW	70	[kg]	·		
Averaging Time-C	ATC	25550	[days]			
Averaging Time-NC	ATN	10959	[days]			
Unit Conversion Factor - Rads	CF-r	1.0E-3	[g/mg]			
Unit Conversion Factor - Metals	CF-m	1.0E-6	[kg/mg]			





